INTEGRATED STUDENT MANAGEMENT INFORMATION SYSTEM

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ABSTRACT

ISMIS is a an integrated system designed to provide students information in order to facilitate schools administration, decision-making and monitoring of students' development in curricular and co-curriculum activities. Specially for teachers and school administrators, the purpose of this project is to develop a student information system that contains the information of the students in a school and provide a system that will enable the retrieval of these information that include students' personal particulars, academic and non - academic achievements as well as performance records and all other items pertaining to student matters. The development of ISMIS is divided into three sections, which are curriculum, student affairs and co-curriculum. This report will only focus on Student Affairs modules. ISMIS is presently partially deployed. All rights are reserved for the Faculty of Computer Science and Information Technology, University of Malaya.

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CHAPTER 1: SYSTEM OVERVIEW

1.1 Introduction

ISMIS, an abbreviation for Integrated Student Management Information System, is stand-alone software that specially caters for every teacher's needs. This software is designed to provide students information in order to facilitate schools administration, decision-making and monitoring of students' development in curricular and co-curriculum activities. A team of three students is developing this integrated software that manages students information on areas such as academic, student affairs and co-curriculum activities. To achieve an integrated system of high standards and quality yet easy to comprehend and manageable is a difficult but a possible task. Thus, a proper research plan is needed to perform the above.

1.2 Research Plan

Project planning is important as to define the objective and scope of the project, recognise the potential problem areas, arrange a sequence of tasks and provide a basis for control. Research planning deals mainly with need assessment and problem diagnosis. Here, the objectives and goals of the ISMIS effort are defined. Many separate tasks will be necessary to achieve the system. These tasks are arranged in a logical sequence based on information priorities and the need for efficiency. The planning includes the following steps:

a) Determination of the user requirements
b) Definition of the objective and scope of the project
c) Recognition of potential problem areas
d) Architecture designs, builds and tests
e) Technical design

f) Quality of verification

1.3 Objective

The purpose of this project is to develop a student information system that contains the information of the students in a school and provide a system that will enable the retrieval of these information that include students' personal particulars, academic and non - academic achievements as well as performance records and all other items pertaining to student matters. The following are the objectives for this project

i) to replace the slow and unreliable existing system
ii) to perform data analysis with ease
iii) to generate numerous reports with various sorts and format at just one click
iv) to produce a data repository which can ensure the security of the data
v) to bring the schools into greater heights through technology

Students' enrolment in schools all around the nation is tremendously increasing. The Malaysian government is fighting to lower the poverty level among the people and the number of children going to school is increasing every year. The existing traditional system that depends completely on paper is very inefficient and ineffective to support and hold all the information on the students.

The schools need a comprehensive system that could simplify the process of storing, retrieving and manipulating data on students. Through ISMIS, school administrators are able to perform data analysis with ease as the system is able to generate reports in graph and chart formats.

School administrators are usually required to generate numerous reports and it is a very tedious task, as they have to find these data from different categories of files. ISMIS has the capability of producing these reports at just one flick of a button.

Data stored in files and portfolios is not safe, as there are high risks of these files of getting lost or even stolen. ISMIS has a data repository that stores all the information in one place, which is definitely more secured. Moreover, only rightful users with correct passwords will have the access to this information.

We are now heading towards a paperless technology where many traditional systems are being automated. Automation of the manual system in schools will be a good move as it can save a lot of money and time. ISMIS will simplify the decision making process in schools and able to produce all-rounded students with many potentials. This is also in line with Vision 2020, which aspires to bring Malaysian schools to greater heights through technology.

1.4 Project Scope

The development of ISMIS is divided into three sections, which are curriculum, student affairs and co-curriculum. Only student affairs section will be discussed here. These are the student affair modules

a) Scholarship

Recording and information retrieval of recipients of scholarships and grants.

b) Discipline record

Restricted record and retrieval, analysis and reporting on confidential reports on student's overall discipline as well as the follow-up and follow through actions by the school.

c) Counsellor 's Report

Recording and retrieval of counsellor's confidential report on students.

d) Attendance

Record and retrieval on student attendance in school. Reporting of negative attendance and notification letter to parents.

e) Text Book Loan Scheme (SPBT)

Provide information on borrowing of books under the text book loan scheme.

1.5 Importance of the Project

ISMIS is a critical enabler, which could transform Malaysian school system. These are the importance of the project

i) to save teachers from bureaucratic record keeping
ii) administrators can be freed from being hampered by incompatible high-maintenance system
iii) to expose and prepare the schools with a simpler system before the Smart School Implementation
iv) to produce students of better quality and capabilities

Nowadays, the teachers in schools are too busy with their record keeping and very often they do not teach as much as they should or want to. ISMIS can change this scenario by eradicating most of their paper work. This will save a lot of their time and enable them to be more attentive to their students.

School administrators are usually unfairly tasked, forced to stretch resources to meet mandates that are incompatible with the delivery of unsuccessful

educational outcomes for the students. They do not have the time to plan and to be focused on the students and their performance. ISMIS does most of their administrative work at just one click of a button and surely it is the right place to start.

The Smart School project by the Malaysian government requires the teachers especially, to be IT oriented and skilled. Implementation of the system would bring a radical change to the existing traditional system. So, ISMIS is a tool that could exploit the teachers to similar environment, so that in the future, they can be prepared for a more advance system.

The implementation of ISMIS in schools would mean lesser work and the administrators can be more tuned to the students accomplishments. This can produce students with better quality and capabilities.

1.6 System Specification

These are the minimum hardware and software requirements to implement ISMIS.

1.6.1 Operating system

- Windows 95 or higher preferably

1.6.2 Hardware requirements

- Computer with celeron processor 400Mhz VGA or higher resolution (SVGA 256 - color recommended)
- 32MB RAM or higher
- Hardisk 4.0GB
- Canon Bubble Jet 255 printer or any kind of color printers
- Mouse and keyboard
- 3 1/2 inch high density disk drive

1.6.3 Software requirements

- Microsoft Access 2000
- Visual Basic 6.0
- Crystal Report 6.0

1.8 Project Milestone

Figure 1.2 relates the ISMIS project milestone based on the system development methodology. The project milestone is important to ensure that all the development phases are implemented in an appropriate period of time, therefore enable the system to be completed on schedule.

ID	Task Name	Start Date	End Date	2000							2001
				Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan
1	Literature Review	16/7/00	18/7/00								
2	Requirements Analysis	18/7/00	26/8/00								
3	System Design	26/8/00	30/9/00								
4	Module Development	30/9/00	1/1/01								
5	Integration Testing	1/1/01	15/1/01								
6	System Testing	15/1/01	20/1/01								

Figure 1.2 ISMIS Project Milestone

1.9 Conclusion

Chapter 1

This chapter introduces the significance, objectives and the importance of the ISMIS project. The modules in ISMIS were briefly explained in the project scope and the technical requirements of ISMIS are also stated. The system methodology gives an overview of how ISMIS is going to be developed and the project schedule was designed based on the methodology.

Chapter 2

Chapter 2 mainly covers the literature review of ISMIS. The evolution of the school management system is reviewed and analysed. The advantages and the shortcomings of other existing student management systems are also discussed.

Chapter 3

This chapter discusses the system methodology of ISMIS and the fact finding techniques involved in gathering the information for this project. The functional and the non-functional analysis that elaborates the modules in ISMIS as well as the constraints placed on the system performance is discussed. It also explains the chosen system development tools and the system requirements that are needed in developing ISMIS.

Chapter 4

Chapter 4 covers the database design and the process design of ISMIS. Database design includes the normalization techniques and elaboration on data dictionary. Structured charts and data flow diagrams of the functionality of ISMIS is given in the process design section. One important element of system design, which is the Input and user interface design, was also discussed in depth.

Chapter 5

This chapter covers the aspects of the implementation of ISMIS. It consists of the development environment and the program development that is involved in the making of ISMIS. The development environment elaborates on the usage of Visual Basic 6.0 and Crystal Report 6.0 that was used as the interface and reporting tool of ISMIS. The program development explains the 4 steps, which are involved in the development of ISMIS, that are review the program documentation, code the program, test the program and complete program documentation.

Chapter 6

In this chapter, the different parts of testing which is done to ISMIS are explained. This includes the White-Box and Black-Box testing which are techniques employed in the testing process. The first stage of testing that the Unit testing is also discussed where it explains the function of each control buttons in all the modules. Next, Integration test covers the functionality of the modules once it has been integrated. Regression testing is about correcting the new errors that are bound to occur once old errors in the system are reconciled. Finally the System testing is to verify that ISMIS has fulfilled the requirements that were made before the system was developed.

Chapter 7

This chapter covers the complete system evaluation of ISMIS from the perspective of Student Affairs modules. The problems and solutions regarding the system are discussed and the feedbacks from two end users are stated. The system strengths and constraints are discussed for the future enhancements of ISMIS. Finally the knowledge and experience gained from developing the system are elaborated.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Project research is very important in the process of developing ISMIS. Research has been done to understand various new concepts, which especially focuses on the student management system. This chapter mainly covers the evolution of information systems in the Malaysian education system, review and analysis of one existing student management systems in Malaysia and two others from Canada and America. A good interface is one of the essentials in developing ISMIS. Based on this, a research was done on the Human Computer Interaction that supports this idea.

2.2 The Evolution of Information Systems in the Education System

The schools in Malaysia are using the manual system to do every administrative works from recording the student's attendance to teachers drowning in record keeping busy-work, rather than teaching. Records are piled up in every corner of the office, collecting dusts and certainly are very unsightly. Typewriters are the main operating tool that was used then, for all reporting purposes. Then, came the first business information systems which, stored groups of records in separate files and were called file-processing systems. Although file-processing systems are a great improvement over manual record-keeping systems, they are not implemented in our schools. Anyway, these are the important limitations with the file-processing system [1]

i) Data are separated and isolated - one must determine which parts of each files are needed; then must decide how the files are related to one another; must coordinate the processing of the files so that the correct

data are extracted. Coordinating two files are difficult, but coordinating ten or more of them are totally incomprehensible.

ii) Data are often duplicated - the most serious problem with this concerns data integrity. For example, if a student are to change his or her name or address, then all those files containing that data must be updated, but the danger is that all of the files might not be updated, causing discrepancies among them. When results are inconsistent, the credibility of the stored data, and even the MIS function itself comes into question.

Database technology was then developed mainly to overcome the limitations of the file processing system. Computers are now becoming part of virtually every activity in organizations. However, Malaysian schools are very slow in adopting and absorbing this technology in their activities. Student information systems, a powerful integrated system, are being utilized as an education solution in many schools all over the world. This technology uses the database to manipulate and manage data in amazing ways. Anyway, very few schools in Malaysia have implemented this system and are still in its infancy stage. Realizing this, the Malaysian government has targeted 'Smart Schools' as one of the seven multimedia applications for rapid development in the Multimedia Super Corridor (MSC) project. Smart Schools has been identified as a critical enabler to transform radically, the Malaysian school system [2]. The implementation shall involve allocating schools according to predetermined levels of technology, ranging from a preliminary level to the highest level. At the highest level, schools are equipped with a high ratio of computers to teachers and schoolchildren, and full multimedia laboratories, Local Area Network and Wide Area Networks [2].

This project will definitely bring Malaysia into greater heights. However, Malaysian schools need some exposure to similar kinds of system or environment so that they can be equipped with something greater such as this in

the future. In this context, ISMIS can certainly be the ideal system to fulfill this requirement.

ISMIS can support the administrators of the school as a tool of decision making and problem solving. They can easily recognize the patterns of improvements or under-performance of their respective schools in areas such as academic and discipline by using ISMIS as it produces data in formats that permits analysis with ease. Time is an important factor that determines the advancement of a society. The ability to use time wisely can allow the Malaysian schools to perform better in every area. Thus, ISMIS could do just that, by eradicating the amount of time spent on their non-core competencies (paper work, calculations, etc.) and enable them to focus on their students' development.

So far, there are only two kinds of programs that are given to the schools in Malaysia for administrative purposes, first is EMIS (Education Management Information System) to record all the information about the school and generate report on the staff and student population in the school. Second, is MAPS (Maklumat Am Pentadbiran Sekolah). There is too little commercial software for student administration in the market. Malaysians should be more involved and alert in the ever-growing information system and participate in its growth to fulfill Malaysia's aspirations in vision 2020.

2.3 Sistem Maklumat Pelajar 99 (smp99)

'Sistem Maklumat Pelajar' system was currently released with the endorsement of the Education Ministry and the same version for primary school, is being implemented in Sekolah Kebangsaan Pasir Puteh, Perak [3]. This database program which uses Microsoft Access 97 was developed to cater for the needs of school personnel especially the teachers. The main function of this integrated

system is to store and manipulate student information regarding their profile, curriculum and non-curriculum activities. These are the modules offered by smp99

i) Input and retrieval of

- Student profile
- Parents or guardians profile
- Monthly exams
- Co - curriculum information

ii) Printing and viewing of

- Students' profile
- Curriculum information
- Co - curriculum information

2.3.1 Shortcomings of smp99

An effective user-interface is one of the main components that could bring success to any kind of system. Though smp99 has very simple graphical interface, it is not however user-friendly because it lacks proper tools such as the 'undo' key that could assist the user from repeating the process and from language wise, the system is using the Malay language but the error messages are in English. Through a thorough analysis that was made on this system, it was discovered that smp99 is missing out on some important modules. These include the input, retrieval and reporting of discipline, health, attendance and the counselor's records. This certainly defeats the purpose of automating the students' administration because these details would still have to be recorded manually. The curriculum module does not have the features to record and analyse the students' PMR and SPM results. This system does not generate students' testimonial and school leaving certificate as well.

2.4 eSchoolOffice - A web-based School Administration and Student Information System

This commercial software was developed by computerActive, a division of Advantage Learning Systems of Canada, in collaboration with educational professionals, the system utilizes Internet technology to provide education system solutions [4]. Although, Canada's education system is different from Malaysia's, analysis was done on the similar modules that are present in any kinds of education systems. Looking from all aspects, eSchoolOffice is a fully integrated software that could certainly improve and maximize the potentials of any school system. It has the necessary tools to generate numerous reports, for instance on the attendance module, it can generate reports on unexcused absences, excused/permitted absence, parent/guardian notification and truant reports.

2.4.1 Shortcomings of eSchoolOffice

The functions and capabilities of eschoolOffice are limited because it is a web server-based system. This means a lot of time will be wasted in waiting for response from the system and at any time the server could be down. When this happens, the administrative work will not be as smooth as expected. The school personnel will also be hampered by high maintenance system as it can create many hassles in terms of data integrity and security. Anyone could hack into the system and change or alter the data as desired. Very clearly, this can happen because internet is an open system.

2.5 Student / 3000 - Integrated Administrative Software For Education

Student /3000 was developed by Quintessential School Systems from California, America for elementary schools [5]. This comprehensive software covers all-important modules including attendance, discipline, sports and health. It is a very detailed system from all aspects and can be an excellent guide for new developers. Looking at the health module itself, these are the capabilities of Student / 3000

i) track immunizations for Polio, DTP, Rubella, Mumps, MMR and Hepatitis B
ii) record testing information on Vision, Scoliosis, Hearing, Color Vision, TB, Skin Tests and Chest X-Rays
iii) provide information on student Handicaps
iv) list of children who require medication during the school day
v) produce parent notification letters for outcome of student health exams or immunization status
vi) print personalized exam forms for students eligible for health programs

Student / 3000 provides a complete solution for student information management at the school level. It may not be appropriate for use in Malaysian schools because the education system in America is different from ours but is indeed a great 'role model' of power-packed state-of-the-art software.

2.6 Human-Computer Interaction (HCI)

ISMIS is a system that is developed for the use of school teachers and administrators. For the system to fulfill this purpose, a good user interface is vital. Human-computer Interaction (HCI) is the study of how people design, implement, and use interactive computer systems, and how computers affect individuals, organizations, and the society [6]. This encompasses the ease of use as well as new interaction techniques for supporting user tasks, providing better access for information, and creating more powerful forms of

communication. It involves input and output devices and the interaction techniques that use them; how information is presented and requested; how the computers' actions are controlled and monitored; all forms of help, documentation, and training; the tools used to design, build, test, and evaluate user interfaces; and the processes that developers follow when creating interfaces.

Users expect highly effective and easy-to-learn interfaces, and developers are realising the crucial role the interface plays. Surveys in the United States show that over 50% of the design and programming effort on projects is devoted to the user interface portion.

2.6.1 Importance of HCI

The HCI is critical to the success of ISMIS in the marketplace, as well as the safety, usefulness, and pleasure. There is substantial empirical evidence that employing the processes, techniques, and tools developed by the HCI community can dramatically decrease costs and increase productivity. Savings are attributed to decreased task time, fewer errors, greatly reduced user disruption, reduced burden on support staff, elimination of training, and avoidance of changes in software after release.

Historically and with some exceptions, computer system developers have not paid much attention to computer ease-of-use. Many computer users today would argue that computer makers are still not paying enough attention to making their products "user-friendly". Computer developers argue that computers are extremely complex products to design and make and that the demand for the services that a computer can provide has always outdriven the demand for ease-of-use. However, there are also well known catastrophes that have

resulted from not paying enough attention to the human-computer interface. Problems with the interfaces of military and commercial airplane cockpits have been named as a likely cause of several crashes. Sometimes, the implementation of the user interface can be at fault, such as when several people died from radiation overdoses partially as a result of faulty cursor handling code in the Therac-25.

Effective user interfaces to complex applications are indispensable [7]. The recognition of their importance in other disciplines is increasing. For artificial intelligence technologies such as agents, speech, and learning and adaptive systems, effective interfaces are fundamental to general acceptance. HCI subdisciplines such as information visualisation and algorithm animation are used in computational geometry, databases, information retrieval, parallel and distributed computation, electronic commerce and digital libraries, and education.

2.6.2 HCI Development

A significant number of major corporations and academic institutions now study HCI. HCI is a research area of increasingly central significance to computer science, other scientific and engineering disciplines, and an ever expanding array of application domains. This more prominent role follows from the widely perceived need to expand the focus of computer science research beyond traditional hardware and software issues to attempt to better understand how technology can more effectively support people in accomplishing their goals. This study can help to determine the important aspects of developing ISMIS as this system must not require any training or computer skills from the user.

HCI research has been highly successful, and has fundamentally changed computing [8]. Examples are the ubiquitous graphical interface as well as that virtually all software written today employs user interface toolkits and interface builders. Even the spectacular growth of the World-Wide Web is a direct result of HCI technology. It is the interface improvements more than anything else that triggered this explosive growth.

2.6.3 Difficulties in Designing Effective User Interfaces

At the same time that a human-centered approach to system development is of growing significance, factors conspire to make the design and development of systems even more difficult than in the past. This increased difficulty follows from the disappearance of boundaries between applications as we start to support people's real activities; between machines as we move to distributed computing; between media as we expand systems to include video, sound, graphics, and communication facilities; and between people as the importance of supporting organisations and group activities is realised.

Another important HCI factor is that different users form different conceptions or mental models about their interactions and have different ways of learning and keeping knowledge and skills (different "cognitive styles" as in, for example, "left-brained" and "right-brained" people). In addition, cultural and national differences play a part. Another consideration in studying or designing HCI is that user interface technology change rapidly, offering new interaction possibilities to which previous research findings may not apply. Finally, user preferences change as they gradually master new interfaces.

2.7 Product Assurance

In the development of ISMIS, it is very important to know the methods used to ensure that ISMIS meet customers requirements standards and good development practices [9]. So, a research on product assurance is made to know the factors that could produce a good software. Product assurance is a collective set of activities carried out to develop and ensure its quality, completeness and recovery from potential disasters. Among the techniques are:

i) Establishing standards for product quality and development technology.

This relates to coding standards, design standards and development methods. Coding standards and ensuring the proper use of control structures, declaration, naming convention of variables and etc. design standards refer to proper design of user interface, database and network. The user interface should resemble the normal Windows application so that the users feel familiar with the program. When developing the database, select the appropriate DBMS and correct implementation (centralized or distributed).

ii) Configuration management

This is concerned with the multi version aspect of software. The purpose of configuration management is to analyze the interdependencies of the modules and the effect of the changes on it. In a system, the code might be written in different modules, and these modules are integrated in the later stages. Each module might be developed by a different programmer, and sometimes there are more than one version of the module. Therefore, management plays an important role here. Proper management will avoid the incorrect distribution of the codes and

modules and subsequently reduces the time and cost of maintaining and retracing the origin of the codes and modules.

iii) Prototyping

Prototypes will uncover 'glitches' and any user requirements that may have been left out. They are also used when the functionality of the system is not well understood by the developer. This happens when the user could not specify his/her requirements in a clear and understandable way to the developer. Therefore, the developer can develop a prototype and let the user play around with it and get his/her feedback.

iv) Benchmarking

Benchmarking is a process of finding out what is vital to the success of the product. It is important to compare the BEST in the market with the product that is being developed. The BEST in the market might not necessary be a 'thing' that is similar to the product being developed, it can be something else. Figure 2.1 indicates some of the important steps in benchmarking.

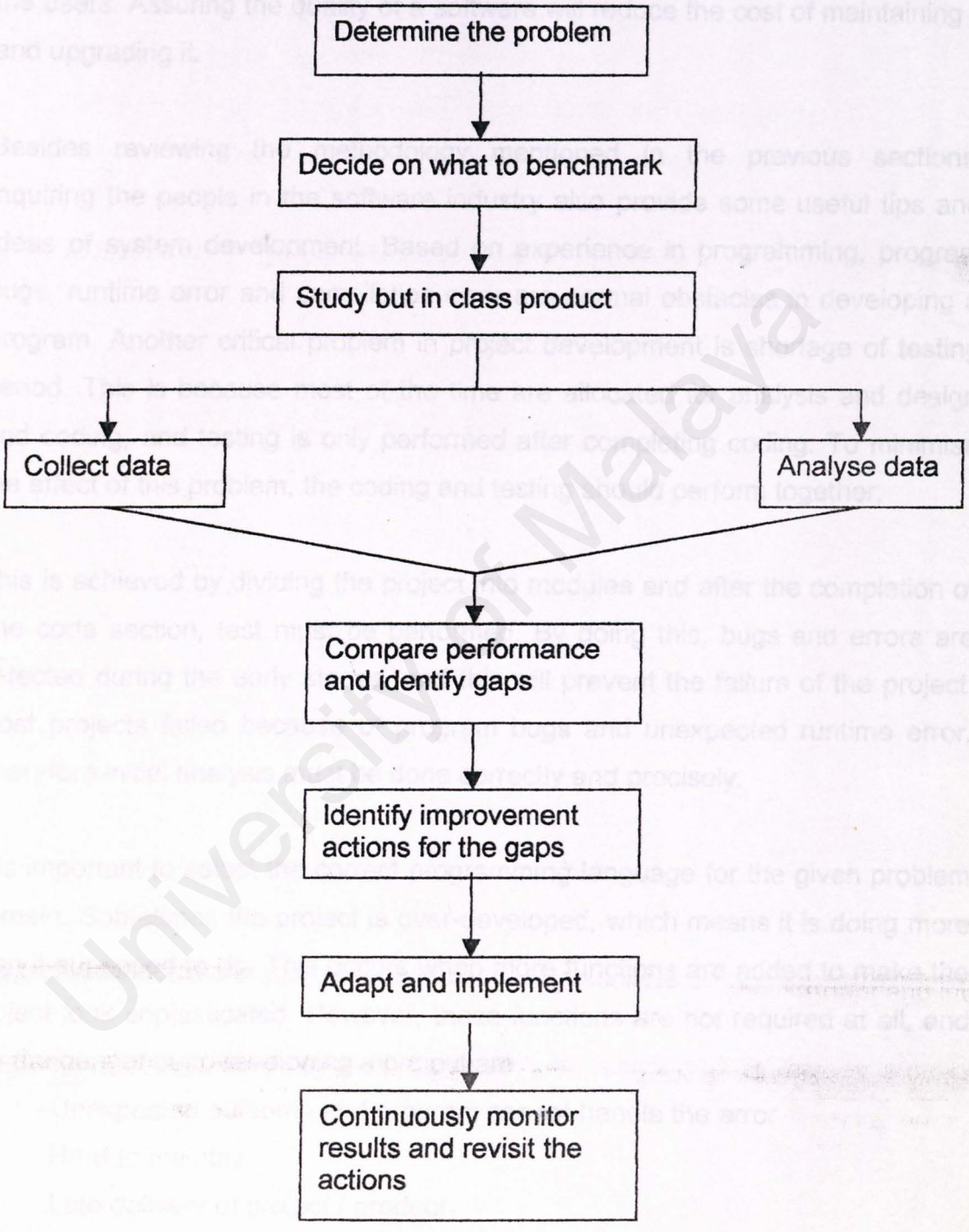


Figure 2.1 Benchmarking

With these methods, the products quality will be assured and thus acceptable to the users. Assuring the quality of a software will reduce the cost of maintaining it and upgrading it.

Besides reviewing the methodology mentioned in the previous sections, inquiring the people in the software industry also provide some useful tips and ideas of system development. Based on experience in programming, program bugs, runtime error and compilation error are normal obstacles in developing a program. Another critical problem in project development is shortage of testing period. This is because most of the time are allocated for analysis and design and coding, and testing is only performed after completing coding. To minimise the effect of this problem, the coding and testing should perform together.

This is achieved by dividing the project into modules and after the completion of one code section, test must be performed. By doing this, bugs and errors are detected during the early stages, and this will prevent the failure of the project. Most projects failed because of program bugs and unexpected runtime error. Therefore initial analysis must be done correctly and precisely.

It is important to select the correct programming language for the given problem domain. Sometimes the project is over-developed, which means it is doing more than it supposed to do. This occurs when more functions are added to make the project look sophisticated. However, these functions are not required at all, and the dangers of over-developing a project are

i) Unexpected outcome and program cannot handle the error
ii) Hard to maintain
iii) Late delivery of project / product
iv) Higher cost

Therefore in order to successfully complete a project these are the things that is vital

i) Select the correct tools

ii) Modular programming for easy maintenance and debugging

iii) Test any completed code ad not wait until the whole program is coded

iv) Time management

v) Remember the scope and objective of the project

2.8 Conclusion

In this chapter, the evolution of information systems in Malaysia's education system was reviewed. Systems comparison and feasibility study was carried out on three software that exists in the market. These are smpp99 (Malaysia), eSchoolOffice (Canada) and Student / 3000 (America). Research was also done on Human - Computer Interaction to stress the importance of a viable interface. Once the issues related to the project system have been reviewed, we can begin with the first phase of the system development methodology, which is defining ISMIS requirements. Chapter 3 discusses the system methodology of ISMIS, the fact finding techniques involved in gathering the information for this project and the functional and non-functional analysis of ISMIS.

CHAPTER 3: REQUIREMENTS ANALYSIS

3.1 Introduction

The objective of this phase is to define ISMIS methodology, information gathering techniques and requirements that are needed in order to fulfill the system's purpose. It is important to take care in understanding, documenting and managing the system's requirements in order to avoid problems in the later stages of the system development. Therefore, the requirements have to be correct, consistent, complete and realistic before proceeding to the design phase.

3.2 System Methodology

The system development methodology, shown in Figure 1.1 describes the sequence of stages of ISMIS development process. This methodology is a combination of the waterfall model and the incremental prototyping model.
The waterfall model is helpful in presenting a high-level view of what will go on during the development of ISMIS and the sequence of events that are expected to be encountered.

However, problems become understood as systems often evolve and alternatives are evaluated. Developers will then be required to backtrack to previous phases to make enhancements. It is not feasible for developers to journey through the entire waterfall model repeatedly for this purpose. Therefore, the waterfall model fails reflect the way systems are really developed, that is with iteration. Realizing this, the incremental prototyping model was integrated into the development methodology to overcome the rigidity of the waterfall model.

The incremental prototyping model will be a more efficient and flexible way to develop the system's modules. It will enable us to assess alternative module design and coding strategies and decide which is best for the system before integrating the different units. Revisions can be made as needed at these early phases rather than at the final system testing stage. This will help save cost and time.

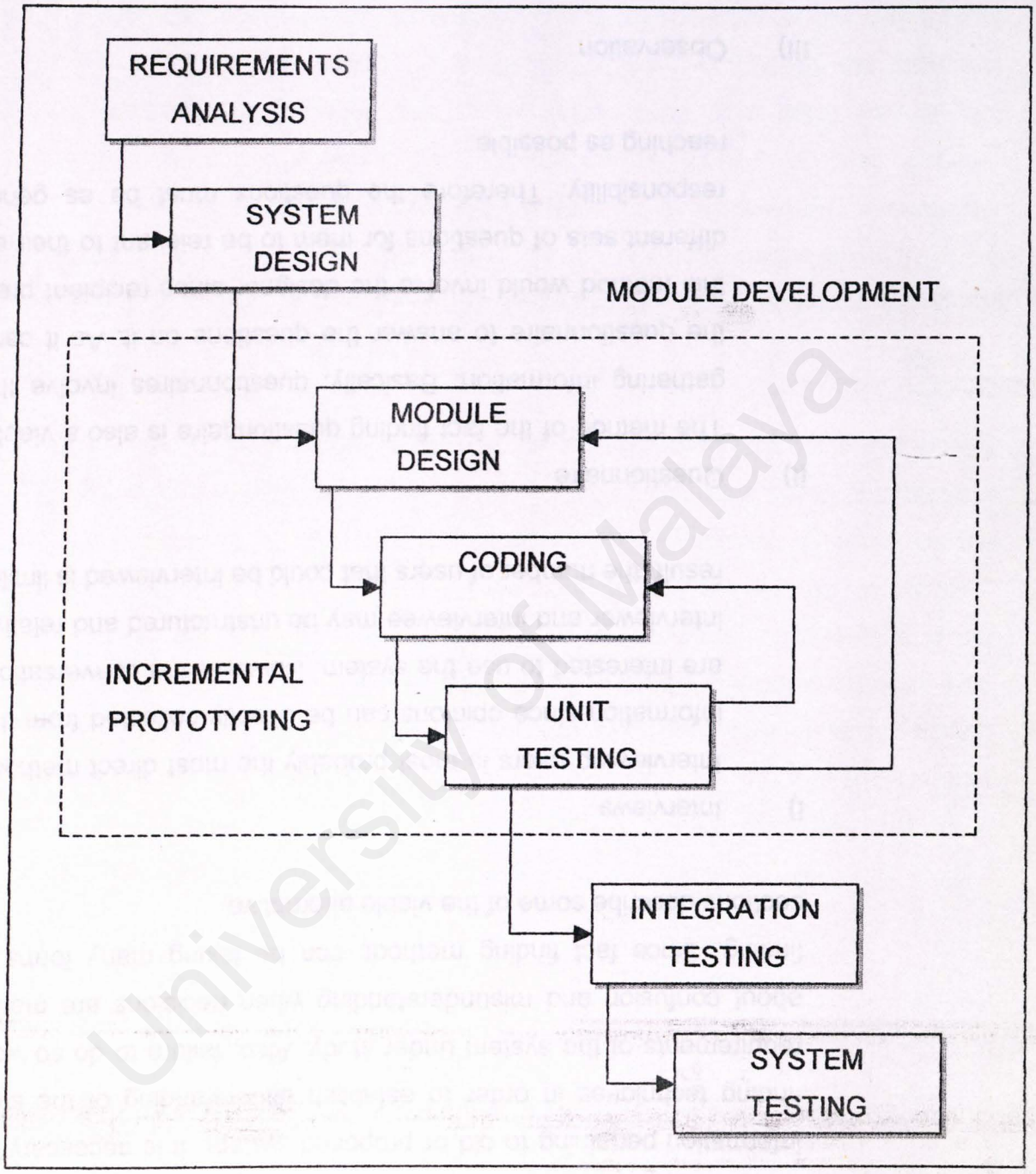


Figure 3.1 System Development Methodology

3.3 Fact Finding

Information regarding the needs, views and suggestions of ISMIS are coll for further analysis. Fact finding refers to the methods employed to g necessary information regarding a system, regardless of whether they information pertaining to old or proposed system. It is necessary to emplo finding techniques in order to establish understanding of the state and f requirements of the system under study. Also, failure to do so would only about confusion and misunderstanding when decisions are made withou finding. Since fact finding methods can be taking many forms, the follo sections describe some of the viable alternative.

i) Interviews

Interviewing users is most probably the most direct method for gath information since opinions can be directly collected from the people are interested to use the system. However the conversation betwee interviewer and interviewee may be unstructured and relatively long. result, the number of users that could be interviewed is limited.

ii) Questionnaire

The method of the fact finding questionnaire is also a viable techniq gathering information. Basically, questionnaires involve the recipie the questionnaire to answer the questions on it. As it can be ded this method would involve the designer since recipient presumably different sets of questions for them to be relevant to their environm responsibility. Therefore the questions must be as general and reaching as possible.

iii) Observation

Observation refers to the analysts being an observer of the day to day running of the system. These would involve looking at the activities happening and noting them down. This could be a good way of fact finding since a first hand experience is gained by the analyst. Unfortunately, most people find t difficult or even resentful of someday looking at them while they are working. Therefore, cooperation must be obtained from all personnel under observation in order for this method of fact finding to be successful.

The two main techniques that is used to gather information for the development of ISMIS is interviewing and observation. Mrs. Jayabalan, the senior assistant of Sekolah Menengah La Salle, Brickfields was interviewed to find out the activities that are done manually in school so that it can be automated. Observation was also done on the activities of the senior assistants and the discipline teacher to determine the processes that could support them in their problem solving through ISMIS. Besides these two techniques, Internet surfing provided a lot of information on the existing student information systems overseas and how they work. Reading is done to gather materials that could assist the development of ISMIS.

3.4 Needs Analysis

Needs analysis can be divided into two main elements which is functional and non-functional requirements.

3.4.1 Functional Requirements

A functional requirement describes an interaction between the system and its environment. In other words, it tells us what the system will do. The following are ISMIS functional requirements for the predefined scope.

i) Student Attendance module

The Student Attendance module allows users to easily record and resolve attendance data. It includes negative attendance recording and the recording of warnings for students with attendance problems. The system, built with flexible report request screens, generates reports with various sorts and format. The reports are student negative attendance profile and average yearly attendance. Utilizing the concept of negative attendance, administrators save time by only having to indicate when students are absent. Attendance reporting provides easy visualization of patterns in student absence and allows the user to immediately identify student needing special attention.

ii) Student Discipline module

This module is designed to simplify the difficult and time consuming task of tracking student discipline. This module helps improve student discipline by ensuring that students are held accountable for their actions. The discipline teachers will be able to view, update, delete and record any disciplinary incidents by students. These are the features in this module

a) Improve discipline by maintaining accountability.
b) Instantly access any student's complete disciplinary history when speaking with parents
c) Automatically track outstanding penalties students owe for single incidents or annual penalty totals.
d) Print student discipline histories

e) Easily and quickly produce user-customised reports

iii) Student Scholarship module

This module will focus on the recording and information retrieval of recipients of scholarship and grants. Through this module, users can track and analyse the number students receiving scholarship and the various donors.

iv) Counsellor's Report

Through this module counsellor is able to record and retrieve the confidential information on students. Patterns of students' social status can be analysed and those needing special attention can be recognised.

v) Text Book Loan Scheme (SPBT)

This module will store the number of students eligible for the text book loan scheme. It can print report of all the students from their respective classes who are permitted to borrow books under this scheme.

3.4.2 Non-functional Requirements

Non-functional requirements describe the constraints or restrictions placed on the system's performance. The following explain ISMIS non-functional requirements for the predefined scope.

i) Users and Human Factors

ISMIS will be used by school teachers and administrators. The interfaces should be tailored to suit their needs and preferences. The screen layout must include objects that they can readily understand in terms of their everyday work, while the interaction between the users and the system should closely correspond to users' normal work and to their mental model of the system.

The GUIs must not complicate the users' work, but instead make it easier and more pleasant. Thus, the user friendliness of ISMIS is of utmost importance to avoid discouraging the utilization of the system. It should be made as easy as possible for the users to understand and use the system without requiring any formal training. At the same time, it has to be difficult to misuse the system. Interfaces will be kept simple yet interesting. Features and functions must be self-explanatory.

ii) Database Security and Integrity

The information in the database should only be created, modified and viewed by the rightful users as explained earlier. Database integrity and security must be given high emphasis as it affects the quality of the information generated and the users' confidence in the system.

iii) Reliable and Efficient Performance

The system must be able to perform its functions reliably and efficiently. For instance, the "view" function should display the correct and complete set of information requested every time, while the "save" function must store the information into the right file without corrupting it. This is important especially when automatic notification letters are printed to parents with a discipline

problem. The lack of reliability will not only reduce the accuracy of information output, but will have a negative effect on the users' confidence in the system.

iv) System Maintainability and Flexibility

An administrator due to the system's modularity can easily maintain ISMIS. Although there are different modules that integrate and work together during the system processes, they are built separately, and thus, can be maintained independently of each other.

The system can be expanded to include more features that can suite the school's particular needs. ISMIS is developed using simple database system, which is already available in the Windows environment. This can enable anyone of basic computer knowledge to maintain and alter the system. The Malaysian education system does not remain static. Thus, ISMIS has to be dynamic and keep up with the latest updates in order to experience long-term success.

3.5 System Development Tool

There are many software available in the market to develop this system. Among the software that are reviewed and analysed are Microsoft Visual Basic, Microsoft Visual C++, Microsoft Access 2000 and Microsoft SQL server.

1. Programming languages

   The two most popular programming language to build Windows based application are Microsoft Visual Basic (VB) and Microsoft Visual C++. Microsoft Visual C++ is an object oriented programming language and VB is an event driven programming language.

Because the system involves a lot user attraction and event driven, Microsoft VB is preferred. Building Windows application with VB is simple because it offers drag and drop capability. Drag and drop means if the programmer wants to create a text box and drag and drop that component to the Window or form. Besides that, there are many Active X (OCX) controls that are available in the market that can be used in VB. OCX is a third party control that can be used as a tool to develop a program. For example, the Microsoft Calendar control, which provides a Calendar, tool. To use this tool, all you need to do is register it in the computer registry and then add it into the tool box. You can then drag and drop the component o the Window or form. VB also provides convenient method for building user interface. We definitely cannot beat VB 6.0 for its simplicity and readability. It is also more forgiving of poor coding style, making it friendlier to new programmers. One example of this is VB 6.0's default variant data type. A variant can handle numeric, string or date / time values. The variant type makes it easy to code without considering the data type of your variables. It can prevent sloppy coding and wasteful use of system memory. VB 6.0 is also an interpreted language system, so users could test and debug application from within the development environment. Another important reason for choosing VB 6.0 as the development tool is because of its compatibility with Window's relational database, Microsoft Access 2000.

2. Database

VB programming language can easily make use of Microsoft Access and Microsoft SQL server database program. Microsoft SQL will too expensive to use for this system as it is for school purposes. Furthermore, the database that is going to be used does not need to be shared therefore Microsoft SQL is not recommended.

Microsoft Access is fast becoming the dominant PC-based database management system for most small database applications. Thus, Microsoft Access 2000 is chosen as the database management system for the development of ISMIS. As a relational database management system, Access stores data in the form of tables which are related to each other based on the business rules of the given situation being attempted to model. Microsoft Access 2000 is chosen with one important reason which is to enable the system administrator who is most likely, a teacher to maintain the system. Other database systems will be very complicated and difficult to manage.

Furthermore, VB is able to create Microsoft Access file using its Jet Engine Database Driver. The Jet Engine Database is fully compatible with the Microsoft Access *.mdb files up to version 7.0. As Relational Database Management System and SQL is going to be used extensively in the system, it is most appropriate to use Access database because it supports these two features. Moreover, this database system is already available in any computer with Windows 2000 or if none it can be installed with very low cost.

3.6 Systems requirements

ISMIS is developed as a stand-alone system. The following are the reasons why ISMIS was not built as a we-based system

i) The information that would be stored in the database is confidential as it contains personal particulars of students. There would certainly be risks of intruders that could sabotage the information if it is web - based because over the internet anybody could access the information illegally.

ii) The use of this stand-alone system is more efficient for the school's administration as using the web-based system would mean a wastage of

time waiting to get connected and at times the line could be busy or server could be down - this will effect the efficiency of the administration.

iii) The cost of using a stand-alone system is much lower compared to the web-based system.

ISMIS is a personal computer based system, which can be installed separately in one more computers as preferred by the school.

3.7 Conclusion

In this chapter, the functional and non-functional requirements in developing ISMIS are explained. The functional requirement explains the modules in ISMIS and the non-functional requirements are about the constraints placed on the system performance. It also includes the elaboration of the chosen system development tools and the system requirements that are needed in developing ISMIS.

Once it is clearly defined what the system must do, the next step in the system development methodology is to translate the requirements into a design that will satisfy the systems objectives. Chapter 4 elaborates this aspect further.

CHAPTER 4: SYSTEM DESIGN

4.1 Introduction

System design is a process through which requirements are translated into representation of software. The representation will be built as illustrated in figure 4.1.

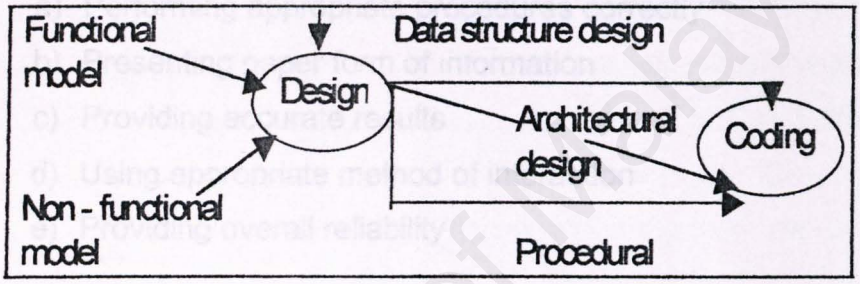


Figure 4.1

System design is a very important factor in system development as it determines the success of the system. The design specification describes the features of a system, the components or elements of a system and their appearance to users. Requirements that are found in analysis stage are the ones actually translated into design specifications.

The objective of a system design is listed below [10]:

i) Specify logical design elements

- Detailed design specification that describe the features of an information system; input, output, files and database and procedures

ii) Support business activities

- Results of using the system help business performance
- Design fits the way the conducts its business
- Technology is secondary to the results produced using the system

iii) Meet user requirements

- Meet user needs stated in terms of
  a) Performing appropriate procedures correctly
  b) Presenting paper form of information
  c) Providing accurate results
  d) Using appropriate method of interaction
  e) Providing overall reliability

iv) Easy to use

- Favourable human engineering
- Ergonomic design that is physically comfortable and contributes to user effectiveness and efficiency.

v) Provide software specifications

- Specifies components and functions with the adequate detail to construct application software.

vi) Conform to design standards

- Design and specification of the design in accordance with prescribed rules and practices of the organisation.

4.2 Process design

ISMIS is designed based on the data flow oriented-design methodology.

4.2.1 Structure chart

Structure chart is used to depict high level of abstraction of a specified system. The use of structured chart is to describe the interaction between independent modules. Major function forms the initial component part of the structure chart, which can be broken into detailed sub-component. ISMIS is divided into three major components mainly Student Profile, Curriculum and Co-curriculum. Each of this three components is further divided into many modules as shown in Figure 4.2.1.

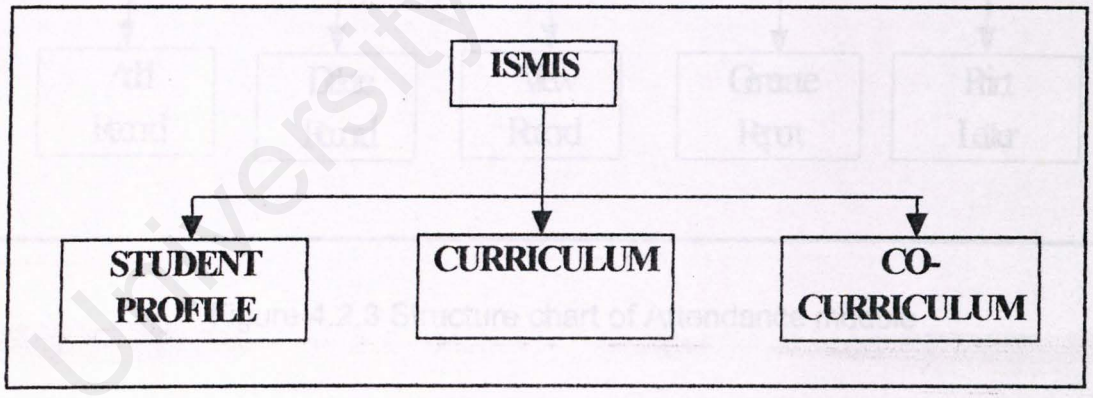


Figure 4.2.1 Structure chart of ISMIS

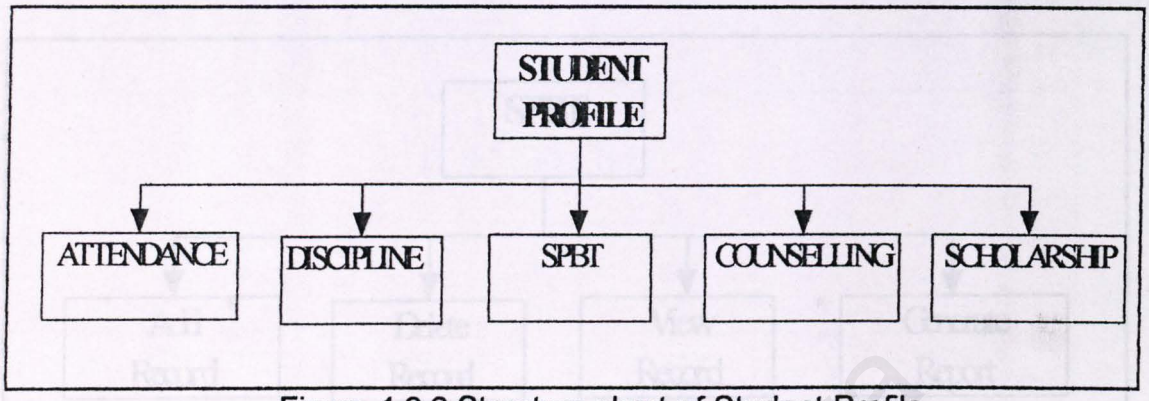


Figure 4.2.2 Structure chart of Student Profile

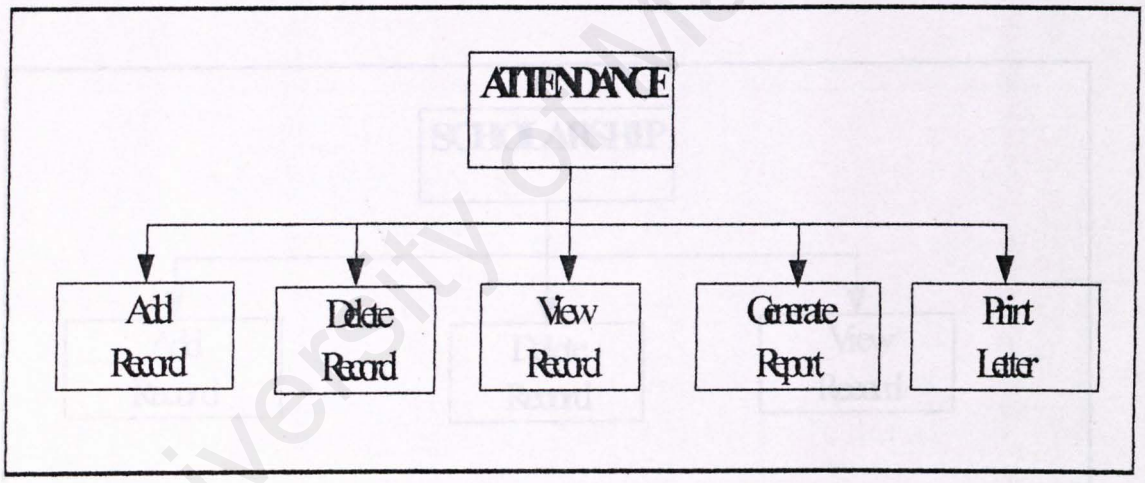


Figure 4.2.3 Structure chart of Attendance module

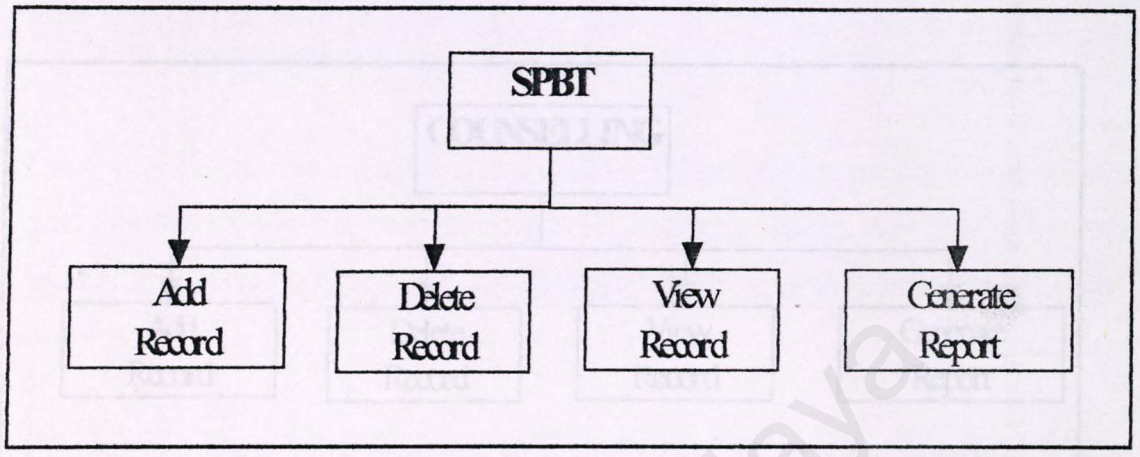


Figure 4.2.4 Structure chart of SPBT module

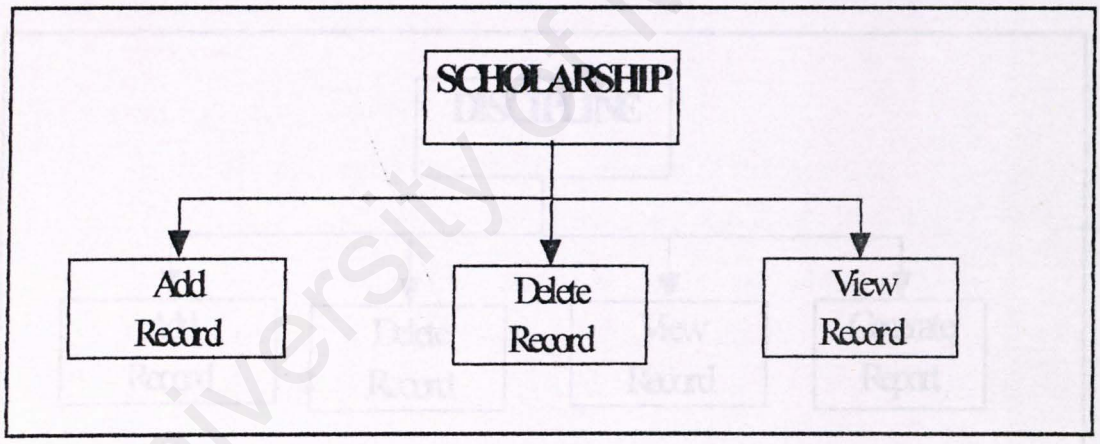


Figure 4.2.5 Structure chart of Scholarship module

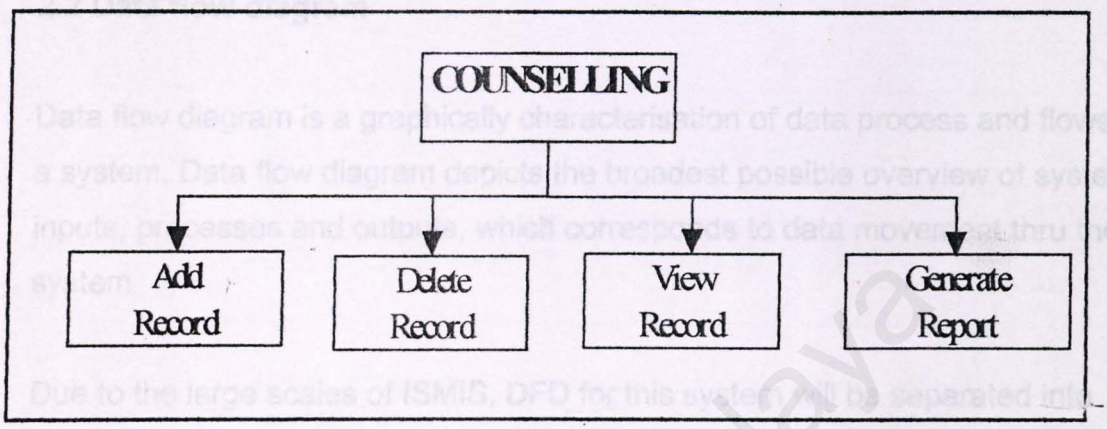


Figure 4.2.6 Structure chart of Counselling module

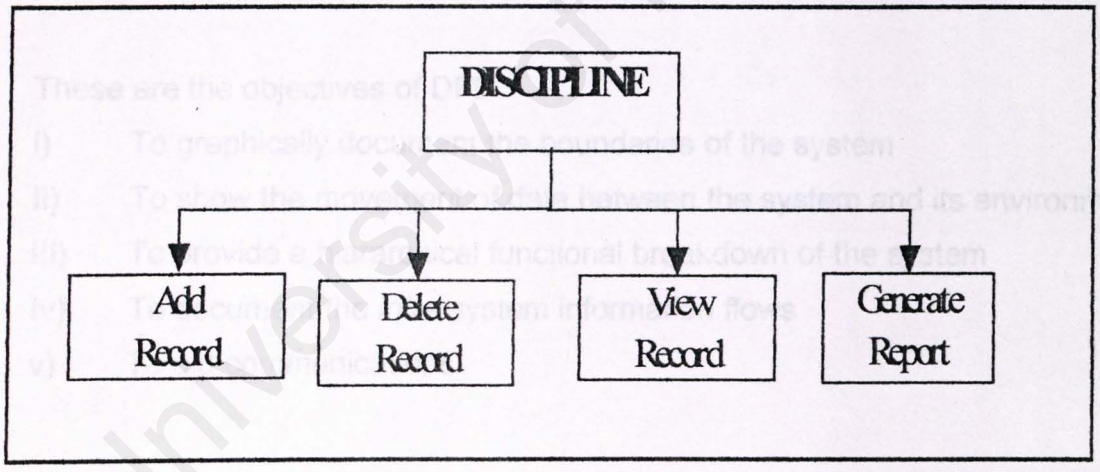


Figure 4.2.7 Structure chart of Discipline module

2.2 Data flow diagram

Data flow diagram is a graphically characterisation of data process and flows in a system. Data flow diagram depicts the broadest possible overview of system inputs, processes and outputs, which corresponds to data movement thru the system.

Due to the large scales of ISMIS, DFD for this system will be separated into smaller modules. Therefore it will be drawn based on the modules and functions as it were divided out in the system. The DFD for ISMIS uses the C.Gane and T.Sarson notation. The components are explained in the table below.

These are the objectives of DFD

i) To graphically document the boundaries of the system

ii) To show the movement of data between the system and its environment

iii) To provide a hierarchical functional breakdown of the system

iv) To document the infra system information flows

v) To aid communications

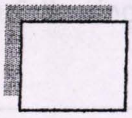
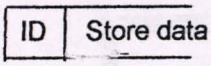
Component	Description
	Entity
	Process which transforms or mar ta within the system. A process is represented by a rectangle which has three parts; identifier, location or person Performs the process and the process name.
	Data store; where the data is held for a time within the system. It consists of two parts; identifier and the simple description of data stored.
	Data flow is a directed line which represents the information from between two obects. The arrow denotes the direction of the data flow. Each data flow is labeled with the name or details of the information represented by the data flow.

Figure 4.2.2

The following figures show the Data Flow diagram for the modules of ISMIS.

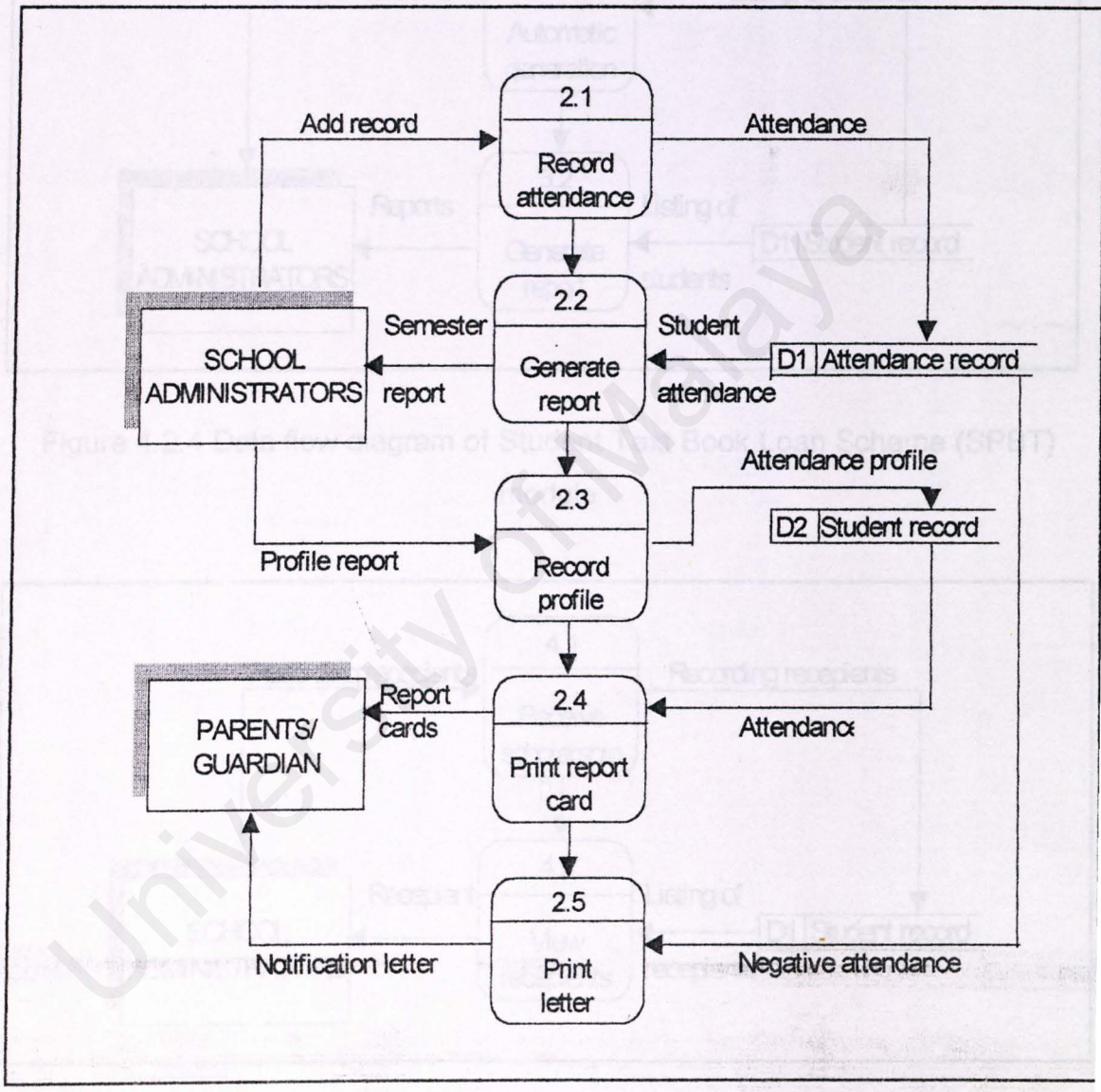


Figure 4.2.3 Data flow Diagram of the Attendance module

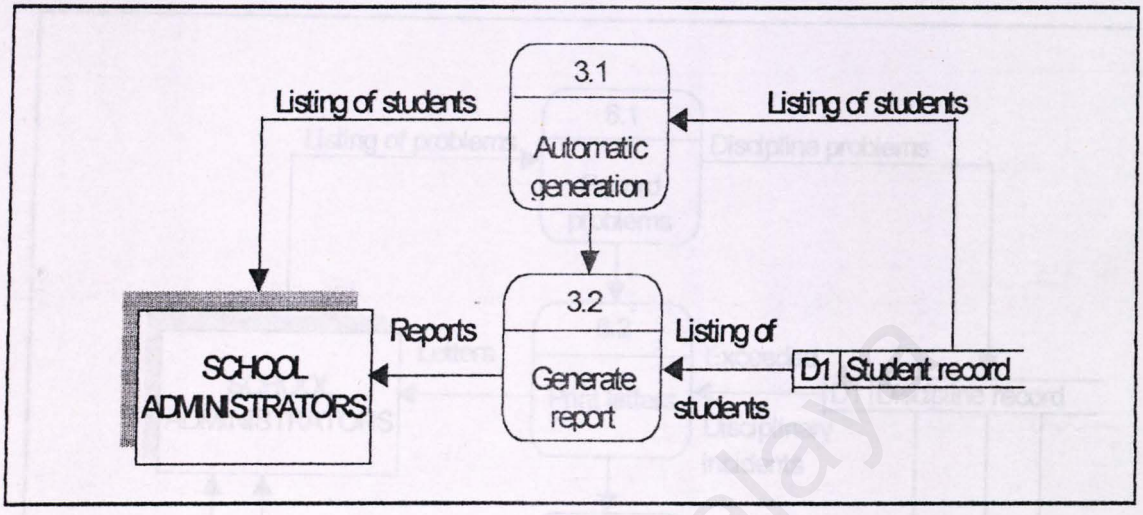


Figure 4.2.4 Data flow diagram of Student Text Book Loan Scheme (SPBT) module

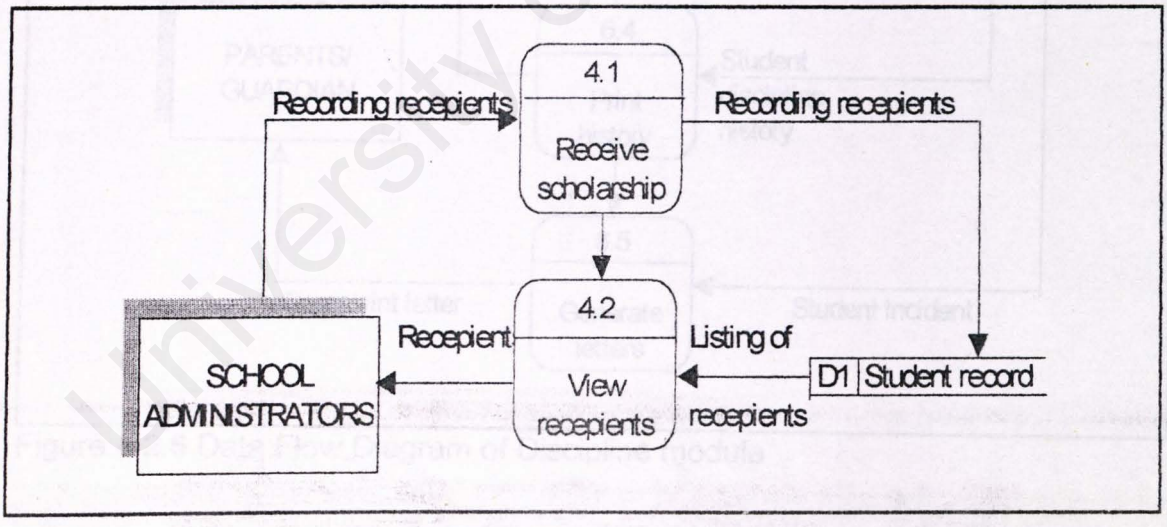


Figure 4.2.5 Data Flow Diagram of Scholarship module

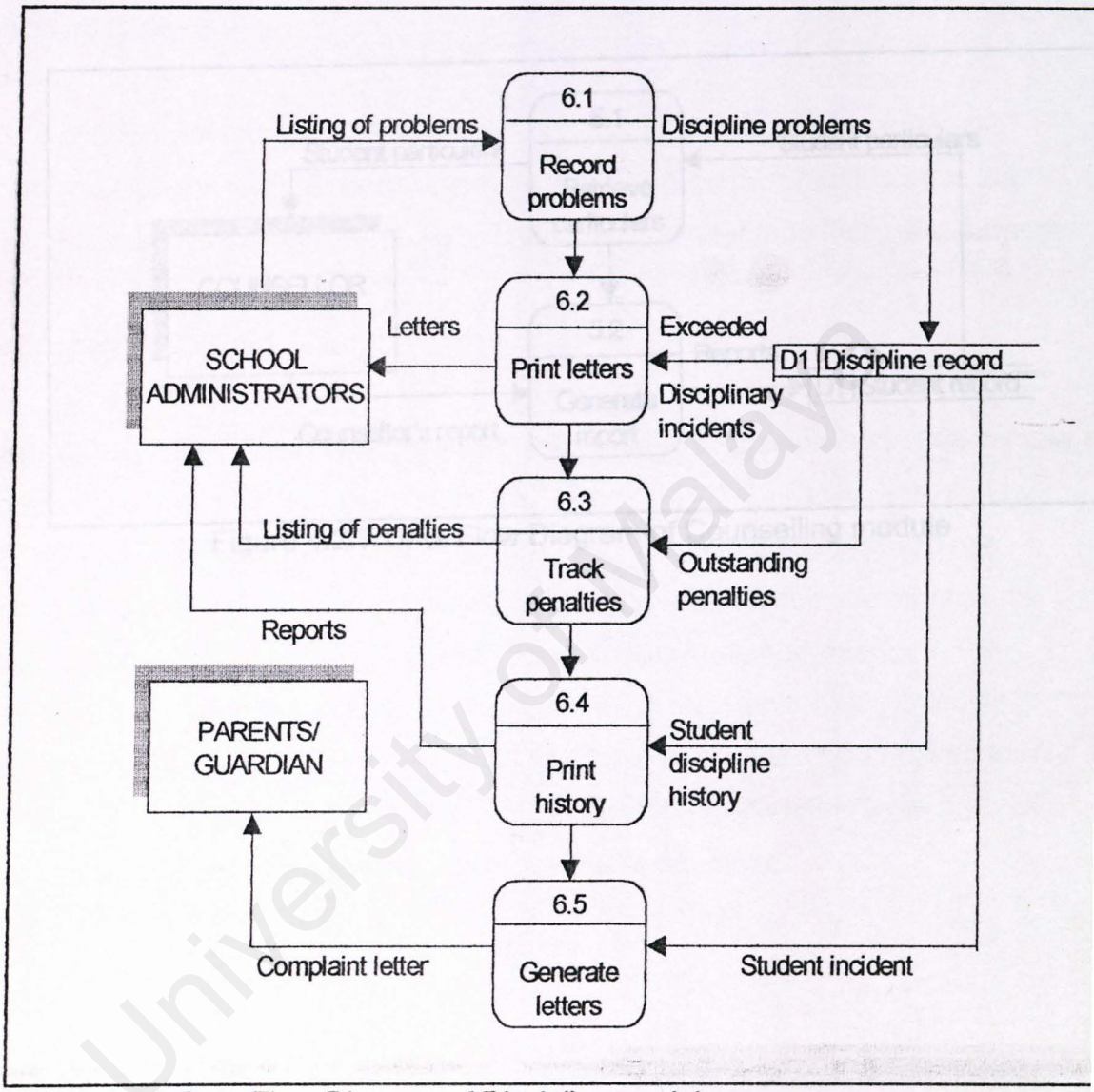


Figure 4.2.6 Data Flow Diagram of Discipline module

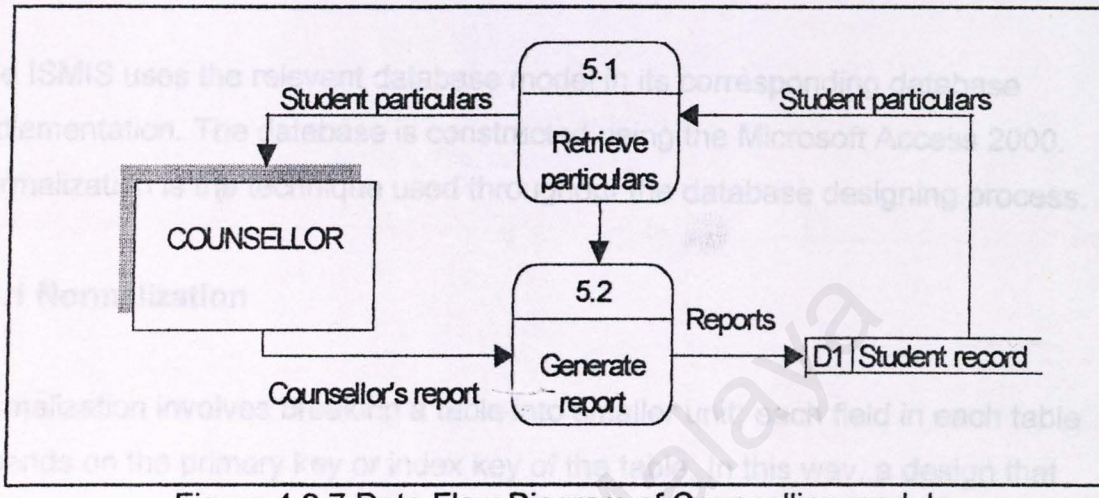


Figure 4.2.7 Data Flow Diagram of Counselling module

4.3 Database design

The ISMIS uses the relevant database model in its corresponding database implementation. The database is constructed using the Microsoft Access 2000. Normalization is the technique used throughout the database designing process.

4.3.1 Normalization

Normalization involves breaking a table into smaller unit; each field in each table depends on the primary key or index key of the table. In this way, a design that is highly flexible can be achieved, allowing this model to be extended when needed to account for new authorities, entity sets and relationship and reduce the need to restructure or reorganize the data. Besides, redundancy in the database can also be reduced. This simplifies the maintenances of the data through updates, insertions and deletions. These principles also enable one to avoid certain update, insertion and deletion anomalies. An anomaly is an inconsistent, incomplete or contradictory state of database.

4.3.2 Normalization steps

The third stage normalization of data structure is attained through the steps as illustrated in figure 4.3.2.

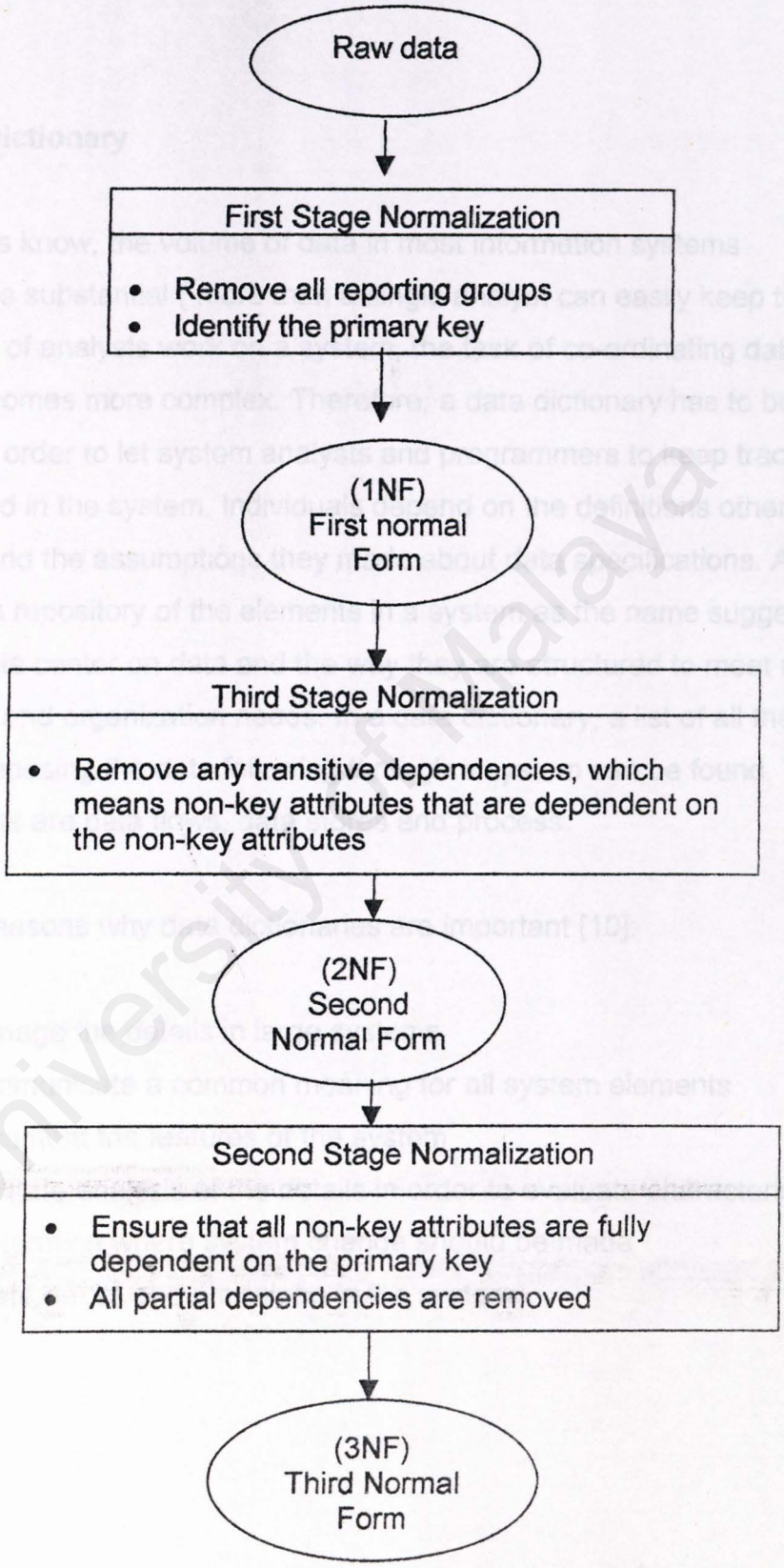


Figure 4.3.2

4.3.3 Data Dictionary

As most of us know, the volume of data in most information systems applications is substantial (more than a single analyst can easily keep track of). When teams of analysts work on a system, the task of co-ordinating data definition becomes more complex. Therefore, a data dictionary has to be developed in order to let system analysts and programmers to keep track of data definition used in the system. Individuals depend on the definitions others established and the assumptions they made about data specifications. A data dictionary is a repository of the elements in a system as the name suggests, these elements center on data and the way they are structured to meet user requirements and organization needs. In a data dictionary, a list of all the elements composing the data following through a system can be found. The major elements are data flows, data stores and process.

There are 5 reasons why data dictionaries are important [10]:

i) To manage the details in large systems
ii) To communicate a common meaning for all system elements
iii) To document the features of the system
iv) To facilitate analysis of the details in order to evaluate characteristics and determine where system change should be made
v) To locate errors and omissions in the system

The database structure of the relevant relations in ISMIS is listed below in the following sections. All relations are in 3rd Normal Form (3NF).

1.) Attendance table

The students negative attendance record is stored in this table. The primary key of Attendance table is 'No_kad_pengenalan' which is the student IC number.

Field name	Data type	Size	Description
Tarikh	Date/time		Date
Tahun_persekolahan	Text	50	Student's school year
No_kad_pengenalan	Text	50	Student's Identity card number
Tingkatan	Text	50	Student's class
Jenis_amaran	Text	50	Warnings(if any)

2.) SPBT table

This table stores the students Text Book Loan Scheme approval. The primary key is P_nokp which is the student's IC number.

Field name	Data type	Size	Description
P_tarikh	Date/time		Date
P_thnpersek	Text	50	School year
P_tingkatan	Text	50	Student's class
P_nama	Text	50	Student's name
P_nokp	Text	50	Student's IC number
P_namabapa/penjaga	Text	50	Guardian's name
P_nama_ibu	Text	50	Mother's name

P_kerja_bapa	Text	50	Guardian's profession
P_kerja_ibu	Text	50	Mother's profession
P_gaji_bapa	Text	50	Guardian's income
P_gajiibu	Text	50	Mother's income
P_gaji_keseluruhan	Text	50	Joint income
P_permohonan	Text	50	SPBT approval
P_anak	Text	50	No of children(studying)

3.) Scholarship table

This table stores the details of the recipients of scholarship. The primary key is B_KP which is the student registration number.

Field name	Data type	Size	Description
B_tarikh	Date/time	50	Current date
B_tingkatan	Text	50	Student's class
B_thnpersek	Text	50	School year
B_namapelajar	Text	50	Student's name
B_KP	Text	50	Student's IC number
B_bilanak	Text	50	No of children(studying)
B_pendaptn	Text	50	Joint income(parents)
B_penaja	Text	50	Donor's name
B_alamat	Text	50	Donor's address
B_poskod	Text	50	Post code
B_negeri	Text	50	State
B_tajaan(RM)	Text	50	Sum of grant

4.) Discipline table

The discipline table stores data on student disciplinary incidents. The primary key is D_IC which is the student's IC number.

Field name	Data type	Size	Description
D_tarikh	Date/time	50	Current date
D_thnpersek	Text	50	School year
D_nama	Text	50	Student;s name
D_IC	Text	50	IC number
D_slhlaku	Text	255	Student's incident
D_tindakan	Text	255	Action taken

5.) Counselling table

This table stores the counsellor's report on students. The primary key is which is the student's registration number.

Field name	Data type	Size	Description
U_thnpersek	Text	50	Student's school year
U_tarikhtemu	Date/time		Date of meeting
U_gurukaunsel	Text	50	Counsellor's name
U_namapelajar	Text	50	Student's name
U_noK/P	Text	50	IC number
U_tingkatan	Text	50	Stdent's class
U_alasantemu	Text	255	Reason for meet
U_gurucadang	Text	50	Name of teacher whom suggested
U_reaksi	Text	255	Reaction of student

4.4 Input and User Interface Design

The quality of system input determines the qualities of system output. It is vital that input forms and screens be designed with this critical relationship in mind. Well designed input forms and display terminal (VDT) screens should meet the objectiveness for effectiveness, accuracy, ease of use, consistency, simplicity and attractiveness. All of these objectives are attainable through use of basic design principles, knowledge of what is needed as input for the system and an understanding of how user should respond to differentiate elements in the forms and screens [11].

Screen design is another important element in the design stage. A badly designed interface will cause the software system to be discarded, irrespective of the functionality that it offers. Knowing this fact ISMIS is placing more emphasis on the user interface design. ISMIS will fully exploit the GUI. ISMIS will use command buttons to represent system functions. A clear function name like 'change password' , 'new record' is displayed on each command button used in the system, thereby the user is presented with a list of numbered choices and asked to make the selection by clicking on desired function button using the mouse, or by pressing the hot key using the keyboard [11].

4.4.1 Guidelines for General Interaction

These guidelines cover the aspects of data entry, information display and overall system control of ISMIS. ISMIS is developed with this guidelines in mind for a good interface. These are the important steps of a good interface

i) Be consistent.

A consistent format for menu selection, command input, data display and the myriad of other functions is typical in the Human Computer Interaction.

ii) Offer meaningful feedback.
Provides user with visual auditory feedback to ensure that two-way communications (between user and interface) is effectively established.

iii) Ask for verification of any non-trivial but potentially destructive action.
If user requests to delete a record, a message should prompt user for confirmation.

iv) Reduce the amount of the information that must be memorized in between actions.
The user should not be expected to remember a list of members or names to be reused in subsequent function.

v) Seek efficiency in dialogue, motion and thought.
Keystrokes should be minimized, the distance a mouse must travel must be considered in screen layout.

vi) Forgive mistakes
A lengthy command name is more difficult to recognize and recall. It may also take up unnecessary space in lists.

4.5 Conclusion

This chapter mainly covers the database design and the process design of ISMIS. The Normalization techniques and elaborated points on data dictionary were given. Process design includes structured charts and data flow diagrams of the functionality of ISMIS. One important element of system design, which is the Input and user interface design, was also discussed in depth. Chapter 5 will be covering the System testing and Implementation.

CHAPTER 5: SYSTEMS IMPLEMENTATION

5.1 Introduction

In the system implementation phase, the system requirements and design are converted into program code. The development environment is very vital in order to achieve this purpose. ISMIS was developed using a modular approach. Each module was developed separately and later integrated into a fully functional system once every module had been successfully tested. The program development will cover the systems implementation phase.

5.2 Development Environment

The software that was used in the development of ISMIS is Visual Basic 6.0 as the interface tool and Crystal Report 6.0 as the reporting tool. These are some of the details on how far those tools are utilized in the software development process and the advantages of the tools.

1) Visual Basic 6.0

VB is a powerful programming language with features such as graphical user interfaces, event handling, object oriented features, error handling, structured programming and much more. In the development of ISMIS, VB provides a convenient method for building user interface. The user interface design in ISMIS utilizes the common controls in VB such as the Data Grid Control and ADO control which are used in the 'Kedatangan' module, MaskedEdit Control, Crystal Report Control and many more.

VB 6.0 is also an interpreted language system, so users could test and debug application from within the development environment. Another important advantage of VB 6.0 as the development tool is because of its compatibility with Window's relational database, Microsoft Access 2000.

2) Crystal Report 6.0

Crystal Report is a reporting tool that can access more than 30 data sources and produces an unlimited variety of presentation -quality reports with ease. It can easily be integrated with the Visual Basic environment and is used to generate reports in the modules of ISMIS. These are the reports that are generated:

a) a report on the students who were absent from school
b) a report on the students with disciplinary problems
c) a report on the student who have consulted the counsellor
d) a report on the student who received the text-book loan scheme
e) a report on students who received scholarship

5.3 Program Development

Program development is the process of creating the programs needed to satisfy an information system processing requirements. Program development consists of 4 steps that are review the program documentation, code the program, test the program and complete program documentation. The testing phase of the program development is explained in Chapter 6 (System Testing).

5.3.1 Review program documentation

In this phase, the program documentation, which is scheduled in the systems design phase, is reviewed. This is important especially in the implementation phase because the development of the modules must be according to what is planned. Any further requirements or enhancements that are vital in this process must be listed as to assure that whatever is planned can be accomplished and is rationale.

5.3.2 Coding approach

The program with a technique called top down, stepwise refinement is an approach that is essential to the development of well-structured program. This approach enables the programmer to terminate the top-down stepwise refinement process when the pseudocode algorithm is specified in sufficient detail for the programmer to be able to convert the pseudocode to Visual Basic. Implementing the Visual Basic program is then normally straightforward. These are then the important elements in the coding approach:

1) Coding Style

Coding style is an important attribute of source code and it determines the intelligibility of a program. An easy to read source code makes the system easier to be maintained and enhanced. The elements of style include internal (source code level) documentation, methods for data declaration and approach to statement construction. [12]

The fragment of a coding shown below are the coding for the 'Undo' button in all of the modules in Student Affairs. This button is pressed when the user wants to

clear the form before the particular record is saved. The purpose of this button is to save time especially if the user had made a mistake in keying the wrong record. If this happens the user do not have to delete every field in the form and start again, this can be done instantly using the 'Undo' button. A message box will appear whenever the button is pressed for existing records in the database to warn the user that the Undo function is only for unsaved records.

```
sAskUser = "Ditekan untuk rekod yang belum disimpan sahaja"
iResponse = MsgBox(sAskUser, vbOK + _
        vbDefaultButton2, "SPBT")
    If (iResponse = vbOK) Then          ' if the user presses OK'
    With Data1.Recordset
      If (.EditMode <> dbEditNone) Then
          .CancelUpdate                 ' the form will be cleared'
          .AddNew
        If (Len(vMyBookMark)) Then
            .Bookmark = vMyBookMark
        End If
  Else
      .Move 0
End If
```

Another coding approach stated below is used for the fields with numeric input. The message box will warn the user if the user presses the alphabet keys from the keyboard to input in the field. This will ensure the integrity of the database

because the values inserted into the tables will be meaningful and contain the correct data.

```
If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then    ' if the input is not number
    KeyAscii = 0
    MsgBox ("Anda hanya boleh masukkan nombor!")
End If
```

Next, this coding style below ensures that the user input the valid number of digits for the Identity card (IC) number. If the user fails to do so, a message will prompt to warn the user to enter a valid IC number.

```
ElseIf Len(mskkp) <> 12 Then        'number of digits not equals to 12'
    MsgBox ("Sila masukkan nombor kad pengenalan yang betul!")
```

The coding documentation as the examples above begins with the selection identifier (variable and labels) names, continues with the composition of commenting and ends with the organization of the program. Indentation is used so that comments can be readily distinguished from code.

2) Internal Documentation

Internal comments provide a clear guide to understanding especially during the maintenance phase of the software development. Comments provide the developer with means of communicating with other readers of the source code. A statement of purpose indicating the function of the module in ISMIS and descriptive comments are embedded with the body of source code, is use to describe processing functions.

3) Naming Convention

The naming convention provides easy identification for the programmer. The naming convention in the modules of ISMIS is created with coding consistency and standardization in mind.

4) Modularity

Modularity reduces complexity, facilitates change results in easier implementation by encouraging parallel development of different parts of a system. The various ISMIS components are functionally independent from each other. New modules can be added or current modules modified, without affecting other modules in the system.

5) Input/Output

The style of input and output in the development of the modules in ISMIS follows the following guidelines:

a) Validate all input data
b) Keep the input format simple; uniform and user friendly
c) Label interactive input requirements, specifying available choices or bounding values
d) Label all output and design reports
e) Display error messages if user makes mistakes

The implementation of ISMIS was based on the guidelines and methods as mentioned above. The final process of the program development is the completion of the program documentation where it is ready to be delivered to the user.

5.4 Conclusion

This chapter covers the aspects of the implementation of ISMIS. It consists of the development environment and the program development that is involved in the making of ISMIS. The development environment elaborates on the usage of Visual Basic 6.0 and Crystal Report 6.0 that was used as the interface and reporting tool of ISMIS. The program development explains the 4 steps, which are involved in the development of ISMIS, that are review the program documentation, code the program, test the program and complete program documentation.

Chapter 6 explains the various testing that was done to the modules of ISMIS.

CHAPTER 6: SYSTEM TESTING

6.1 Introduction

Testing is a verification and validation process. Verification refers to the set of activities that ensure that the correctly implements a specific function. Validation refers to a different set of activities that ensure that the software has been built is traceable to customer requirements. Software testing is a critical element in system development to discover a defeat or bug that is present in the system. A successful test is one which no error are found.

All newly written systems must be tested thoroughly, there is no exception of ISMIS. Testing has to be done throughout system development and not just at the end. ISMIS was tested with the following generic characteristics:

- Testing begins at the module level and works 'outward' toward the integration of the entire computer-based system
- Different testing techniques are appropriate at different points in time
- Testing and debugging are different activities but debugging must be accommodated in any testing strategy

6.2 Testing Techniques

Two techniques were employed in the testing process:

6.2.1 White Box Testing

White Box Testing sometimes called glass-box testing is a test case design method that users the control structure of the procedural design to derive test cases. By using White Box testing methods the following test can be derived:-

a) Guarantee that all independent paths within a module have been exercised at least one
b) Exercise all logical decision on their True and False sides
c) Execute all loops at their boundaries and within their operational bounds
d) Exercise internal data structure to assure their validity

6.2.2 Black Box Testing

Black Box testing focuses on the functional requirements of the software Black Box testing enables the software engineer to derive sets of input conditions hat will fully exercise all functional requirements for ISMIS. Black Box testing is not alternative to White Box techniques. Rather it is a complementary approach that is likely to uncover a different class of than White Box methods.

Black Box testing attempts to find errors in the following categories:

a) Incorrect or missing functions
b) Interface errors
c) Errors in data structure or external database access
d) Initialization and termination errors

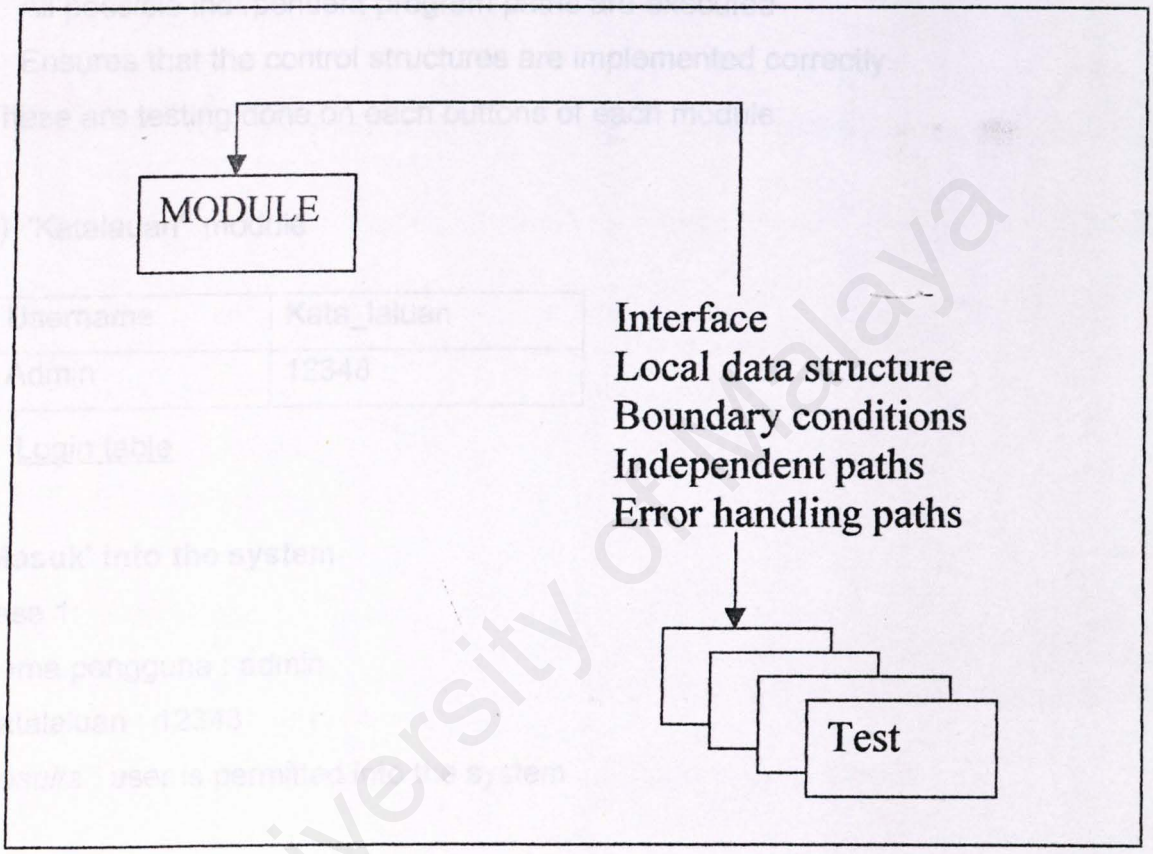
6.3 Testing Strategies

Testing strategies adopted during the development of ISMIS consists of unit testing, integration testing, regression testing and system testing.

6.3.1 Unit Testing

In this first stage of testing, each program component is tested on its own isolated from the other components in the system. Unit testing verifies that the

components functions properly with the types of input expected from studying the components design. Unit testing is done in a controlled environment.



The following areas are tested during unit testing ISMIS:

a) Interface

Testing the interface to ensure that information flows properly into and out of the program unit.

b) Boundary value analysis

Ensure that the module operator properly at boundaries established to limited or restricted processing.

c) Error handling paths

Ensure that the specific module executes the recovering process should an error occur. For example the updating process should be able to continue to function again after encountering duplication record in the database.

d) All possible independent program paths are executed

Ensures that the control structures are implemented correctly.

These are testing done on each buttons of each module:

1) 'Katalauan' module

Username	Kata_laluan
Admin	12348

Login table

'Masuk' into the system

case 1:

Nama pengguna : admin

Katalaluan : 12348

Results : user is permitted into the system

Case 2 :

Nama pengguna : admin

Katalaluan : 12347

Results : user is not permitted into the system and is warned to re-enter the password.

'Tukar Katalaluan'

Nama pengguna : admin

Katalaluan : 12348

Results : user is permitted to change password

2) 'Tukar Katalaluan' module

'Tukar Katalaluan'

case 1:

Katalaluan baru : 1234

Tolong masuk sekali lagi : 1234

Results : password is changed as a result in the table below.

Username	Kata_laluan
Admin	1234

Login table

3) 'Disiplin' module

'Tambah Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not added and error message is generated.

Case 2:

The fields are inserted completely.

Results: A new empty record is shown for input.

'Simpan Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not saved and an error message is generated.

Case 2:

The fields are inserted completely.

Results: The record is saved and verification message is generated.

'Padam Rekod'

Case 1:

Attempt to delete a record that has not been saved yet.

Results: The record is not deleted and an error message is generated.

Case 2:

Attempt to delete an existing record.

Results: A conformation message is generated and the record is deleted if the user chooses to.

'Buat Semula'

Case 1:

Attempt to undo a record that is in the database.

Results: An error message is generated to warn the user and the record is not affected.

Case 2:

Attempt to undo a record that has not been saved yet.

Results: The record is cleared and a new sheet is shown for input.

'Kemaskini'

Case 1:

The fields are edited.

Results: Prompts message telling the user to edit the fields and then to click 'Simpan rekod' to save the changes.

'Batal'

Case 1:

User wants to leave the module.

Results: The 'Hal -Ehwal Pelajar' menu is displayed.

4) 'Biasiswa' module

'Tambah Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not added and error message is generated.

Case 2:

The fields are inserted completely.

Results: A new empty record is shown for input.

'Simpan Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not saved and an error message is generated.

Case 2:

The fields are inserted completely.

Results: The record is saved and verification message is generated.

'Padam Rekod'

Case 1:

Attempt to delete a record that has not been saved yet.

Results: The record is not deleted and an error message is generated.

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Attempt to delete an existing record.

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'Batal'

Case 1:

User wants to leave the module.

Results: The 'Hal -Ehwal Pelajar' menu is displayed.

4) 'Kaunselling' module

'Tambah Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not added and error message is generated.

Case 2:

The fields are inserted completely.

Results: A new empty record is shown for input.

'Simpan Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not saved and an error message is generated.

Case 2:

The fields are inserted completely.

Results: The record is saved and verification message is generated.

'Padam Rekod'

Case 1:

Attempt to delete a record that has not been saved yet.

Results: The record is not deleted and an error message is generated.

Case 2:

Attempt to delete an existing record.

Results: A conformation message is generated and the record is deleted if the user chooses to.

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Case 1:

Attempt to undo a record that is in the database.

Results: An error message is generated to warn the user and the record is not affected.

Case 2:

Attempt to undo a record that has not been saved yet.

Results: The record is cleared and a new sheet is shown for input.

'Kemaskini'

Case 1:

The fields are edited.

Results: Prompts message telling the user to edit the fields and then to click 'Simpan rekod' to save the changes.

'Batal'

Case 1:

User wants to leave the module.

Results: The 'Hal -Ehwal Pelajar' menu is displayed.

5) 'SPBT' module

'Tambah Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not added and error message is generated.

Case 2:

The fields are inserted completely.

Results: A new empty record is shown for input.

'Simpan Rekod'

Case 1:

The fields are not inserted completely.

Results: The record is not saved and an error message is generated.

Case 2:

The fields are inserted completely.

Results: The record is saved and verification message is generated.

'Padam Rekod'

Case 1:

Attempt to delete a record that has not been saved yet.

Results: The record is not deleted and an error message is generated.

Case 2:

Attempt to delete an existing record.

Results: A conformation message is generated and the record is deleted if the user chooses to.

'Buat Semula'

Case 1:

Attempt to undo a record that is in the database.

Results: An error message is generated to warn the user and the record is not affected.

Case 2:

Attempt to undo a record that has not been saved yet.

Results: The record is cleared and a new sheet is shown for input.

'Kemaskini'

Case 1:

The fields are edited.

Results: Prompts message telling the user to edit the fields and then to click 'Simpan rekod' to save the changes.

'Batal'

Case 1:

User wants to leave the module.

Results: The 'Hal -Ehwal Pelajar' menu is displayed.

6) 'Kedatangan' module

'Batal'

Case 1:

User wants to leave the module.

Results: The 'Hal -Ehwal Pelajar' menu is displayed.

6.3.2 Integration Testing

Integration testing is the process verifying that the components work together as described in the system and program design specification. It ensures that the interface among the components in the ISMIS are defined and handled properly. In this context, the three modules, Student Affairs, Curriculum and Extra - curriculum were integrated and tested so that all modules are correctly linked and works in a proper flow.

6.3.3 Regression Testing

Correcting faults during the testing process, and introduce new faults while fixing old ones. Regression testing identifies new fault that may have been introduced as current ones are being corrected. It also verifies that a corrected version still performs the same functions in the same manner as the previous version. Some

of the modules in ISMIS caused some new problems when old ones were corrected.

6.3.4 System Testing

System testing is actually a series of different test whose primary purpose is to fully exercise the computer based system. For ISMIS the primary purpose of this testing is to verify that all systems elements have been properly integrated and perform the allocated functions. The Student Affairs module verified that it met the following requirements:

a) able to view the records of the students in all the modules
b) able to update the records of the students in all the modules
c) able to add new records of the students in all the modules
d) able to delete the records of the students in all the modules

6.4 Conclusion

In this chapter, the different parts of testing which is done to ISMIS are explained. This includes the White-Box and Black-Box testing which are techniques employed in the testing process. The first stage of testing that the Unit testing is also discussed where it explains the function of each control buttons in all the modules. Next, Integration test covers the functionality of the modules once it has been integrated. Regression testing is about correcting the new errors that are bound to occur once old errors in the system are reconciled. Finally the System testing is to verify that ISMIS has fulfilled the requirements that were made before the system was developed.

Once it has been clearly stated the testing that are done to ISMIS, the next chapter will contain the evaluation on the system. In this chapter the feedback from the end-user is gained and it also discusses the system strengths, problem encountered during the development and the evaluation by the developer of the system.

CHAPTER 7: SYSTEM EVALUATION

7.1 Introduction

ISMIS, an integrated student management information system software is designed to provide students information in order to facilitate schools administration, decision-making and monitoring of students' development in curricular and co-curriculum activities.

The purpose of this project is to develop a student information system that contains the information of the students in a school and provide a system that will enable the retrieval of these information that include students' personal particulars, academic and non - academic achievements as well as performance records and all other items pertaining to student matters. These are project scope in the Student Affairs module:

a) Scholarship

Recording and information retrieval of recipients of scholarships and grants.

b) Discipline record

Restricted record and retrieval, analysis and reporting on confidential reports on student's overall discipline as well as the follow-up and follow through actions by the school.

c) Counsellor 's Report

Recording and retrieval of counsellor's confidential report on students.

d) Attendance

Record and retrieval on student attendance in school. Reporting of negative attendance and notification letter to parents.

e) Text Book Loan Scheme (SPBT)

Provide information on borrowing of books under the text book loan scheme.

Therefore, the strengths and limitations, problems and solutions of the system will be evaluated based upon the scope above.

7.2 Problems Encountered and Solutions

These are the problems encountered and their solutions in the Student Affairs modules :

a) Lack of Resources

There is very little Student Management Software in the Malaysian market so much so that only one partially complete system was discovered which is the SMP99. It was very difficult to develop an ideal system because there is no example of such integrated systems to refer to.

Solution : The Smart School Flagship Application that was released by the Ministry of Education of Malaysia was used as a guideline for developing this system.

b) Complex School Administration

The schools may have different ways and methods in catering for their students needs depending the nature and background of their students. For example, a school for boys may focus more on the statistics of smoking delinquencies among their students, it being their core problem area. Whereby a girls school located in the town area may concentrate on truancy among their students. This

has certainly caused some difficulties in developing the automatic graph generation for disciplinary delinquencies because the school may not be interested in viewing the whole picture of the problem. Moreover there are no standards that can be followed because the delinquencies are also very complex.

Solution : The automatic chart generation was not developed to curb the problem above, otherwise the chart generation tool would become redundant.

c) *Database Linking*

As was proposed the database for ISMIS was designed using Access 2000 but the linking with Visual Basic 6.0 could not be done. That resulted in some difficulties in developing ISMIS as the modules could not be tested and integrated. The reason behind this problem could be the lack of mastery among the developers of ISMIS for the failure of doing so.

Solution : The ISMIS database which was in the Access 2000 version was converted to prior version, Access 97 in order to connect to Visual Basic 6.0. The connection was successful and the developers could proceed with the testing and integration.

7.3 Evaluation By End users

The evaluation of the system was done by a senior assistant, Ms. Rosemand and a teacher Ms. Wong, both from the school Sekolah Menengah La Salle, Brickfields, Kuala Lumpur. This evaluation was done on the Student Affairs modules. These are their views and suggestions on the system:

a) 'Disiplin' module

This module was proposed in the system proposal phase to be able to automatically generate notification letters to parents of students who has reached beyond the limits set for disciplinary delinquencies. But it was discovered through the user's feedback that this function would not be appropriate for the system because in the practical school environment, the discipline teacher might consider not to punish or sent any notification for the student's behavior upon the student's appeal for forgiveness or pardon.

Furthermore, the student's disciplinary wrongdoings may be very complex and require detail investigation by their Discipline teachers before any disciplinary action could be taken. But besides that, on the whole the users feel that the retrieval of the information on students is very easy and fast compared to their existing method of going through the massive piles of files.

b) 'Kedatangan' module

Upon testing this module, the users felt that the recording of students' attendance is already done manually in the school's record book and so it is unnecessary to do it twice. They felt that it would be better if the teachers were able to view only the students who are absent from school. This would enable them to easily track students who are absent on a regular basis. The module was then designed to perform this task as mentioned above.

The users are satisfied with the easy way of recording the data of the students in the 'Kedatangan' module. This is because this module uses the Data Grid Control tool in the interface, which simplifies the adding, updating, deleting and viewing process.

7.5 System Constraints and Future Enhancements

There are a few limitations of ISMIS from the perspective of Students Affairs modules. The Students Affairs modules do not have the help file feature to assist the user in deployinh ISMIS. The limited time constraint and lack of mastery in VB 6.0 was the reason why it was not developed. For the future enhancement of the system, it is hoped that the system can include this tool.

Next, ISMIS is developed as a stand-alone system where in the practical school environment, the system might be installed in only one or two computers in the school. The utilization of the system can be maximized if the schools are equipped with Client/Server environment. This can certainly minimize the usage of paper in the school's administration. This can also be the future enhancement of the system that is to be developed as a Client/server system.

ISMIS does not have the feature to store information regarding the school's administration, background and history. This could then be added as an enhancement to the software.

7.6 Knowledge and Experienced Gained

Developing ISMIS has provided a great opportunity for the developers to gain ample of knowledge and skills. These skills comprise learning a new programming language, which is Visual Basic 6.0, and building a database with Microsoft Access 2000. The coding methods learned in Visual Basic 6.0 utilizes the new features in the version 6.0 as an example the Data Grid Control used in the 'Kedatangan' module.

Communication skills were also built among the three developers of ISMIS as the process requires co-operation and understanding in adopting new ideas into

the system. These skill are also extended to the evaluation process which was done in cooperation with the end-users of the system.

7.7 Conclusion

This chapter covers the complete system evaluation of ISMIS from the perspective of Student Affairs modules. The problems and solutions regarding the system are discussed and the feedbacks from two end users are stated. The system strengths and constraints are discussed for the future enhancements of ISMIS. Finally the knowledge and experience gained from developing the system are elaborated.

ISMIS has achieved its objectives as a student's management information tool and it is hoped that the system will be given a fair chance to prove itself as a good decision support system for schools administrators.

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Appendix A:

User Manual

ABSTRACT

ISMIS, Integrated Student Management Information System is developed especially for the deployment of secondary schools in Malaysia. It is designed to provide students information in order to facilitate schools administration, decision-making and monitoring of students' development in curricular and co-curriculum activities. ISMIS will enable the recording, retrieval, and manipulation of these information. Reports that can be generated through this system are bound to help the administration in decreasing their workload.

The objective of this user manual is provide the system administrator with guidance on the configuration and deployment of ISMIS.The development of ISMIS is divided into three sections, which are curriculum, student affairs and co-curriculum. This user manual will only focus on Student Affairs (Hal Ehwal Pelajar) modules.

TABLE OF CONTENTS

A.1: SYSTEM OVERVIEW

A.1.1 Introduction

ISMIS is a stand-alone software that specially caters for every teacher's needs. The purpose of this project is to develop a student information system that contains the information of the students in a school and provide a system that will enable the retrieval of these information that include students' personal particulars, academic and non - academic achievements as well as performance records and all other items pertaining to student matters.

The ISMIS user manual is meant to guide both the system administrator and the users. Since the system is designed for the use of public schools in Malaysia, its prerequisites are minimal. This user manual contains 3 chapters. This chapter describes the characteristics and functionality of ISMIS. The installation notes for ISMIS is in Chapter A.2 and Chapter A.3 is a step-by-step guide for users.

A.1.2 System Objectives and Functionality

ISMIS is designed with the emphasis on its supportive role as a tool for a teacher, rather than as a replacement for his/her own reasoning process. The reason behind the development of this system is to replace the slow and unreliable existing system in our schools. This system will enable the teachers to perform data analysis with ease and to generate numerous reports with various sorts and format at just one click. The objective of this system is also to produce a data repository which can ensure the security of the data pertaining to students. Last but not least, ISMIS is also bound to bring our country's schools into greater heights through technology.

A.1.3 Modules

The 'Hal Ehwal Pelajar' section of ISMIS contains 5 modules:

a) 'Kedatangan'

Record and retrieval on negative student attendance in school. Reporting of negative attendance and warnings for students who have exceeded the limit.

b) 'Disiplin'

Restricted record, retrieval and reporting on confidential reports on student's overall discipline as well as the follow-up and follow through actions by the school.

c) 'Biasiswa'

Recording ,retrieval and reporting of recipients of scholarships and grants.

d) 'Skim Pinjaman Buku Teks (SPBT)'

Recording, retrieval and reporting of recipients of SPBT

e) 'Kaunselling'

Recording ,retrieval and reporting of counsellor's confidential report on students.

A.1.4 System Features

A.1.4.1 User Friendly Interface

The graphical user interfaces were designed with the human factor kept in mind. The screen layout is simple yet interesting. Users can navigate within the system or make inputs easily by clicking buttons. The features and functions are

self-explanatory, making it easy for the users to understand and use the system without requiring any formal training. The terms used correspond with the users' everyday work.

A.1.4.2 Efficient Error Handling

Users are notified by the system of any errors made. Errors are handled immediately, so as not to cause the system to hang or bring about other future errors.

A.1.5 Copyright

The copyright of all work relating to ISMIS is reserved for the Faculty of Computer Science and Information Technology, University of Malaya.

A.1.6 Conclusion

This section of the user manual contains the system overview of ISMIS were it explains the system objectives and functionalities. The system features and modules are also briefly stated. The next part of the user manual will discuss on the requirements for the installation of ISMIS.

A.2 INSTALLATION GUIDE

These are the minimum hardware and software requirements to implement ISMIS.

A.2.1 Operating system

- Windows 95 or higher preferably

A.2.2 Hardware requirements

- Computer with celeron processor 400Mhz VGA or higher resolution (SVGA 256 - color recommended)
- 32MB RAM or higher
- Hardisk 4.0GB
- Canon Bubble Jet 255 printer or any kind of color printers
- Mouse and keyboard
- 3 1/2 inch high density disk drive

A.2.3 Software requirements

- Microsoft Access 2000
- Microsoft Visual Basic 6.0
- Crystal Report 6.0

A.2.4 System Administrators Installation Guide

These are the step by step installation guide for ISMIS:

1) Start Windows 95 or above
2) Insert the setup disk 1 in your floppy disk drive
3) From the *Start* menu select the *Run* command

4) Type *a:\ setup.exe* or *b:\setup.exe*

5) Install ISMIS into the *C:\Program Files* directory

Once you properly set up the system, you may be able to see an icon with the name 'Sistem' on your desktop. To enter the system, simply double click on the icon.

A.3 USERS GUIDE

A.3.1 Introduction

This section consists a step-by-step guide for users of the 'Hal Ehwal Pelajar' modules of ISMIS. It shows the interfaces in these modules and instructions on the permitted values to be inserted in all the fields. Guidelines are given on the functions of all the control buttons in the interfaces and the error messages that are generated in each module.

A.3.2 Main Menu

Figure A.3.2 - frmmenu.frm

1) To enter the 'Hal-Ehwal Pelajar' modules in ISMIS press the button that shows this label in main menu as in Figure A.3.2 - frmmenu.frm.
2) Pressing the button as said above will direct you to the login module as in Figure A.3.3 - login.frm

A.3.3 Login

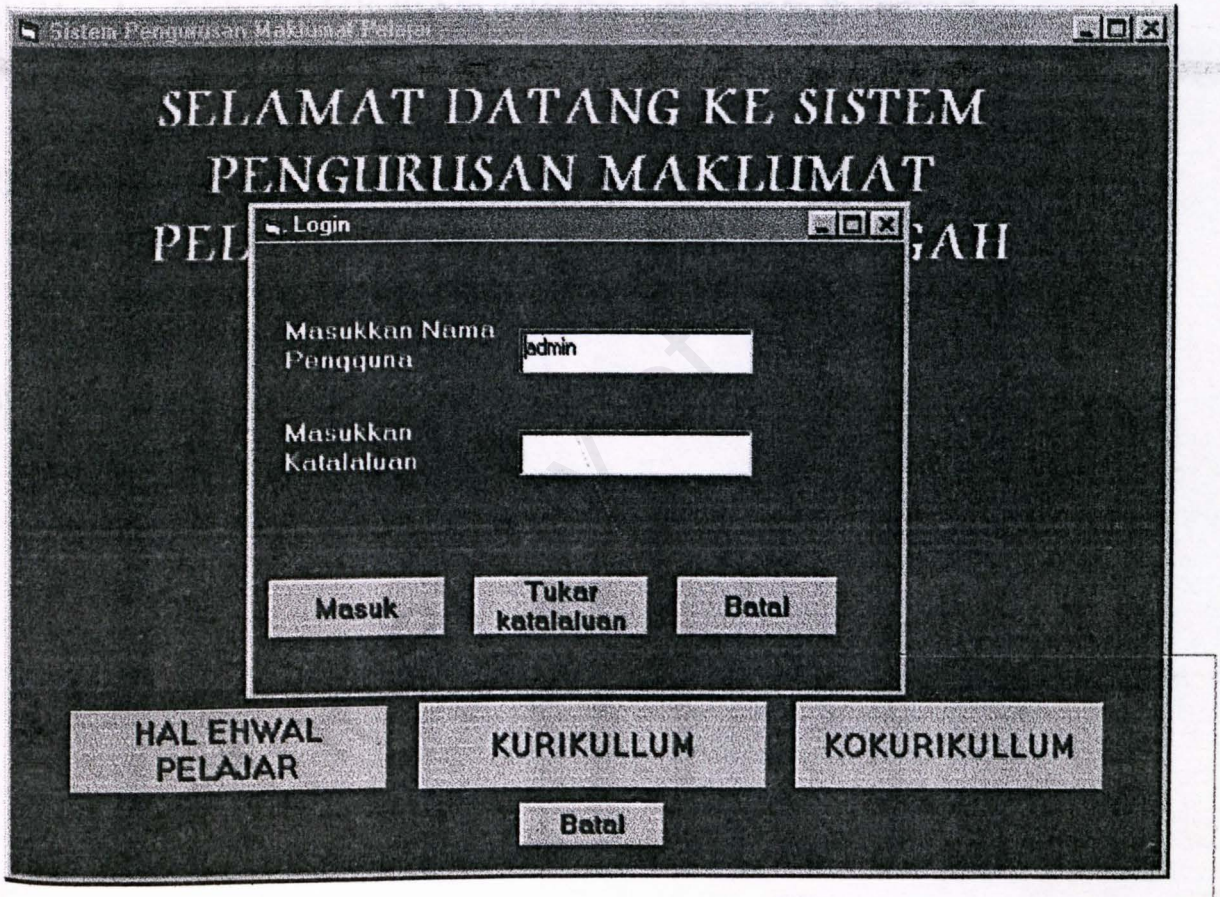

Figure A.3.3 - login.frm

Fields :

1) The 'Masukkan Nama Pengguna' field has a default value which is admin'

2) The 'Masukkan Katalaluan' field must be inserted with the password that has been set -'12348' or it can be changed by the system administrator. Only numeric values (numbers) are allowed for this field. An error message will be generated if the non-numeric is entered.

ıttons:

1) 'Masuk' - Click on this button to enter the system once the correct password has been entered. An error message will be generated if a wrong password is entered.
2) 'Tukar Katalaluan' - click on this button to change the password. It will direct you to the 'Tukar Katalaluan' form (Figure A.3.3 -tukar.frm). An error message will be generated if the button is clicked without the correct password entered first.
3) 'Batal' - Click this button to exit. You will be directed to the main menu.

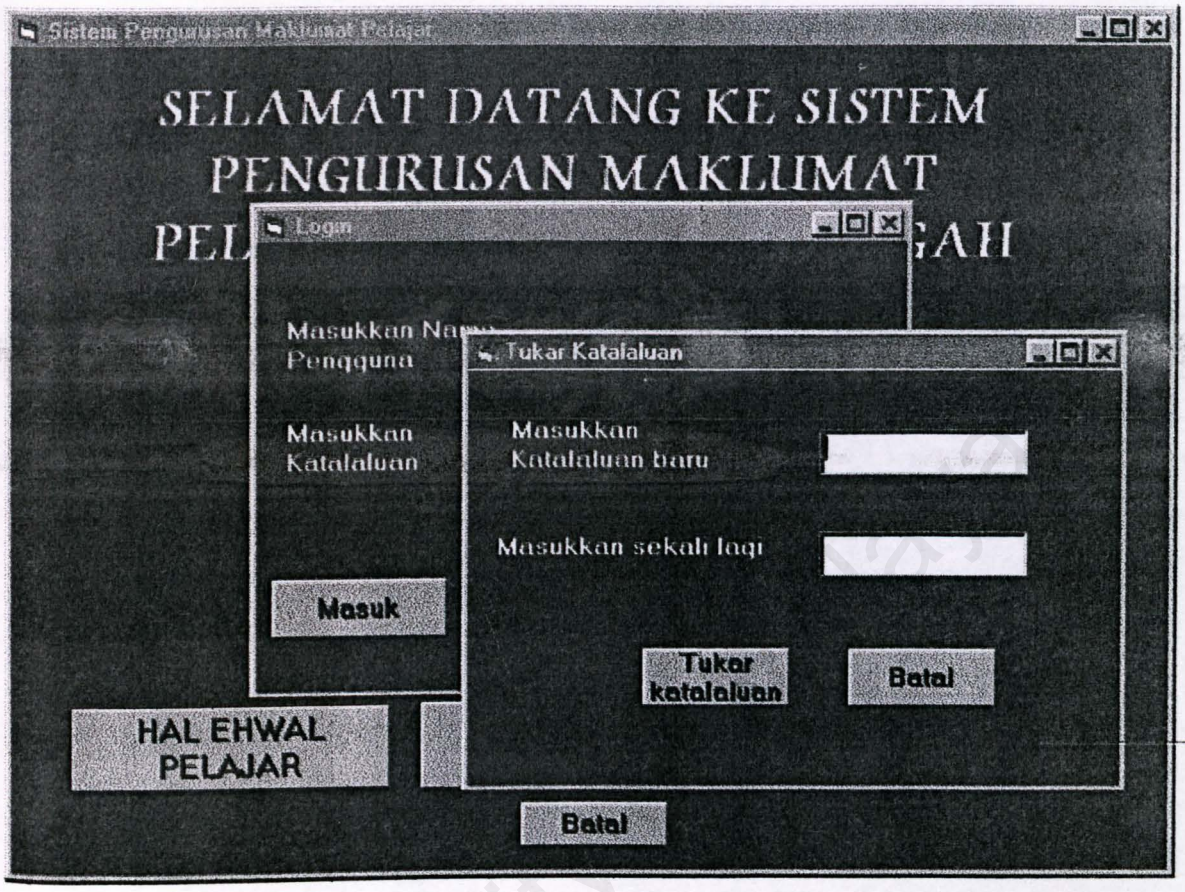

Figure A.3.3 - tukar.frm

Fields:

1) ' Masukkan Katalaluan baru' - Enter the new password. Only numeric value is allowed otherwise an error message will be generated.
2) 'Masukkan sekali lagi' - re-enter the new password. Only numeric value is allowed otherwise an error message will be generated. The value entered must be the same as the field before.

Buttons:

1) 'Tukar Katalaluan' - Click this button to change the password. It will direct you to the login form (Figure A.3.3- login.frm). Re-enter the password and click 'Masuk' to enter the modules. An error message will be generated if

the 'Masukkan Katalaluan baru' and 'Masukkan sekali lagi' do not have the same value.

2) 'Batal' - Click this button to exit to the login form (Figure A.3.3- login.frm).

A.3.4 'Hal-Ehwal Pelajar' Menu

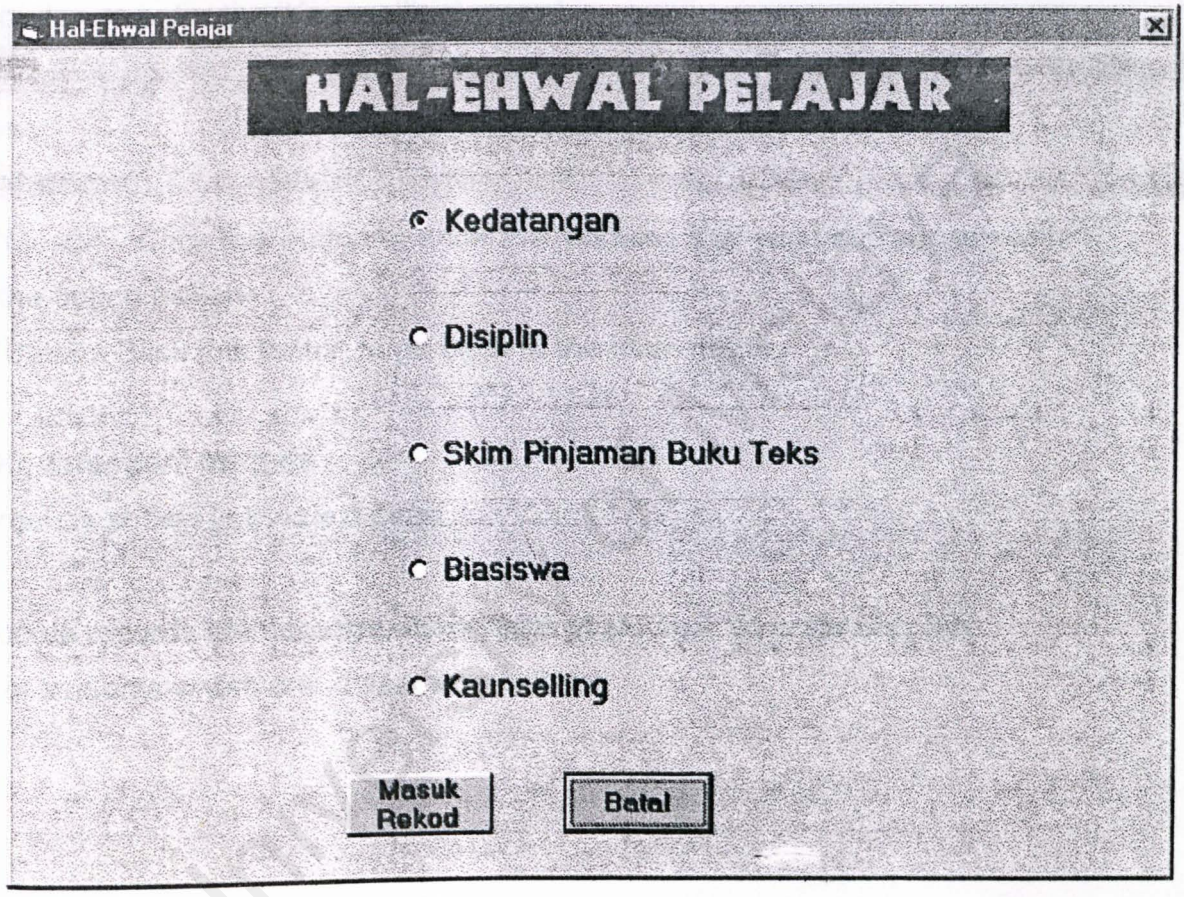

Figure A.3.4 - hep.frm

Option Buttons:

1) 'Kedatangan' - Click this button and proceed with the 'Masuk Rekod' button to enter the 'Kedatangan' record.
2) 'Disiplin' - Click this button and proceed with the 'Masuk Rekod' button to enter the 'Disiplin' record.

3) 'Skim Pinjaman Buku Teks' - Click this button and proceed with the 'Masuk Rekod' button to enter the 'Skim Pinjaman Buku Teks' record.
4) 'Biasiswa' - Click this button and proceed with the 'Masuk Rekod' button to enter the 'Biasiswa' record.
5) 'Kaunselling' - Click this button and proceed with the 'Masuk Rekod' button to enter the 'Kaunselling' record.

Buttons:

1) 'Masuk' - Click this button to enter the modules that you have chosen with the option button.
2) 'Batal' - Click this button to go back to the main menu.

A.3.5 'Kedatangan' module

The screen is shown in the next page.

This module records the negative attendance of student, so enter only the details of students whom are absent from school.

Fields :

1) 'Tarikh' - Enter the current date.
2) 'Tahun persekolahan' - Enter the current school year.
3) 'Tingkatan' - Enter the class name.
4) 'No kad pengenalan' - Enter the identity card number.
5) 'Jenis Amaran' - Enter the warnings('Amaran1', 'Amaran 2', 'Amaran 3', 'Tindakan Disiplin') for students if available.

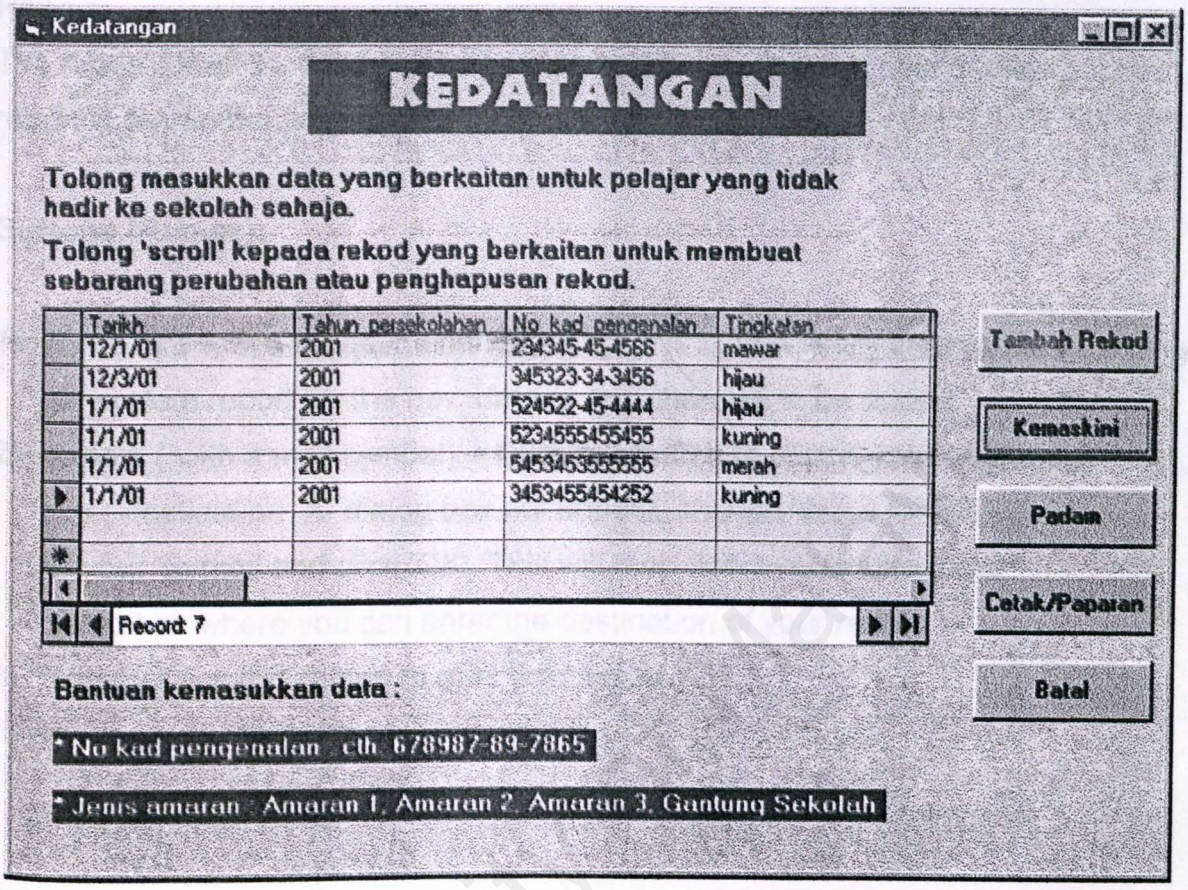

Figure A.3.5 - kedatangan.frm

Buttons:

1) 'Tambah Rekod' - Click this button to add a new record.
2) 'Kemaskini' - Click this button after an update is done.
3) 'Padam' - Click this button to delete a record. A confirmation message will appear for the user to verify the delete, click 'Yes' to perform the delete and 'Cancel' to cancel it.
4) 'Cetak/Paparan' - Click this button to view the report on the negative attendance.
5) 'Batal' - Click this button to exit and you will be directed to the 'Hal-Ehwal Pelajar' menu.

Report:

The report for all the modules has the same format. The example of the report is shown below in figure A.3.5 - report.rpt.

Buttons (Report):

1) 'Refresh' (with a thunder symbol) - Click this button every time you generate a report for the new data or any changes to be added.
2) 'Export' (with a mail symbol) - Click this button to export your data to the other destination. A dialog box will appear, choose 'Word for Windows' as your 'format' and click 'OK'. This will then direct you to the export dialog box where you can enter the destination of your report.
3) ' Print' - Click this button to print your report.

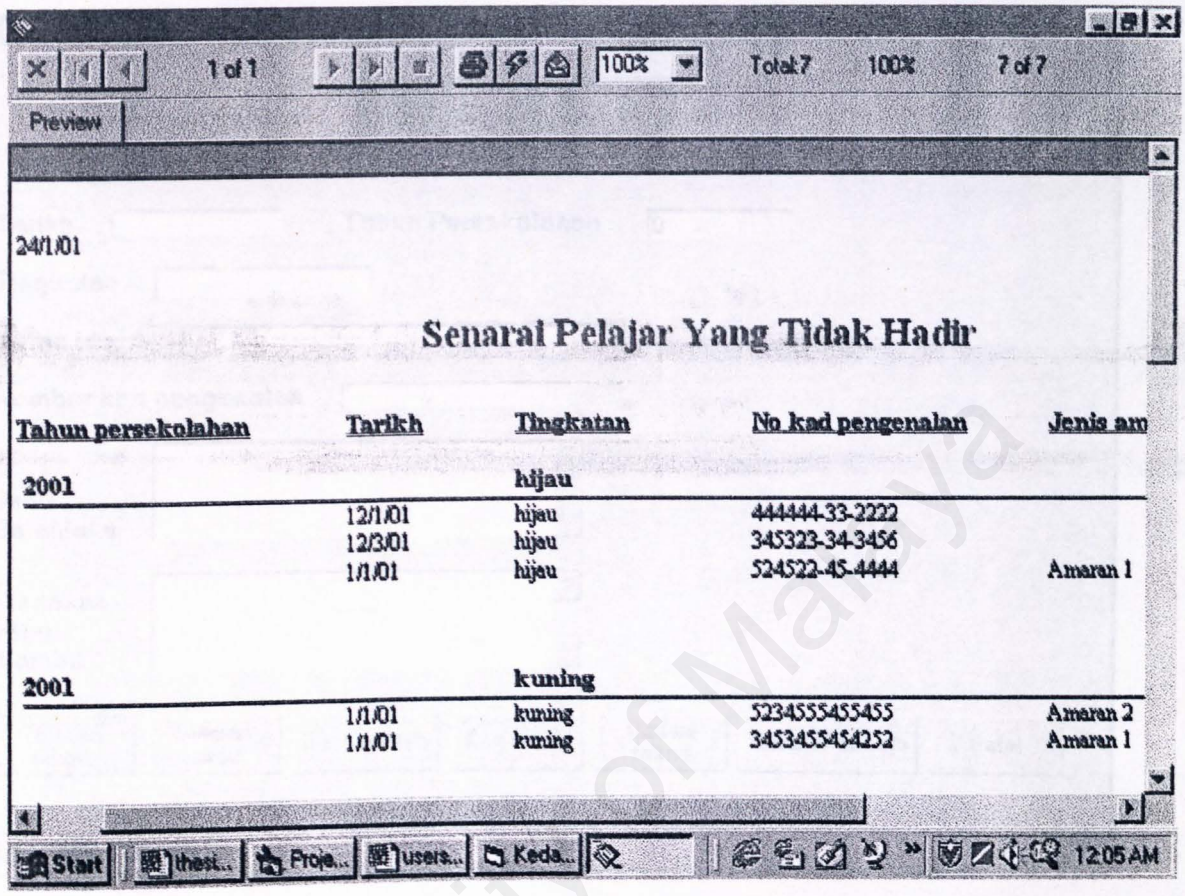

Figure A.3.5 - report.rpt

A.3.6 'Disiplin' module

Fields :

1) 'Tarikh' - Enter the current date with the format - dd/mm/yy.
2) 'Tahun Persekolahan' - Enter the current school year. Only numeric values are permitted otherwise an error message will be generated.
3) 'Tingkatan' - Enter the class name.
4) 'Nama murid' - Enter the student's name.

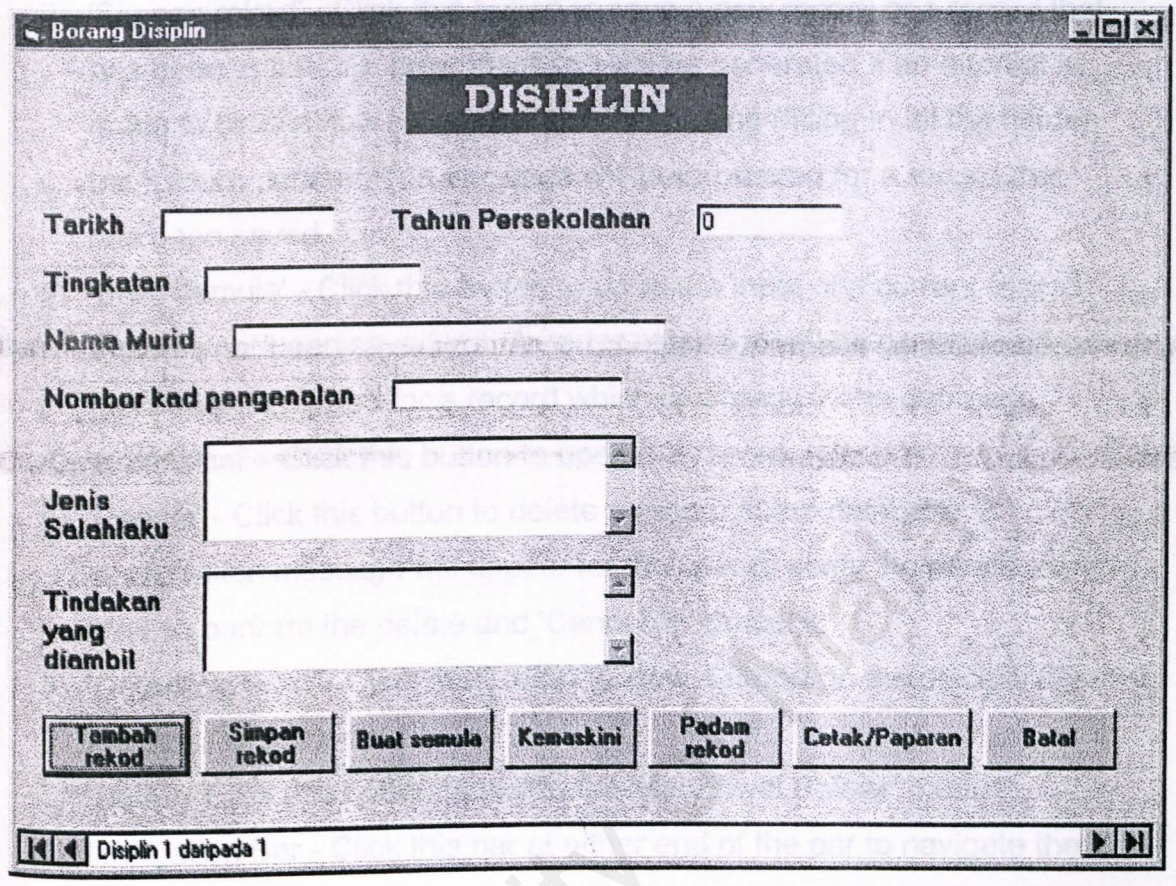

Figure A.3.6 -disiplin.frm

5) 'Nombor kad pengenalan' - Enter the student's identity card number with the format e.g 456787089780. An error message will be prompted for incorrect input of IC number.
6) 'Jenis salahlaku' - Enter the disciplinary incident of the student.
7) 'Tindakan yang diambil' - Enter the action taken by the school.

Buttons:

1) 'Tambah Rekod' - Click this button to add a new record. An error message will be generated if an attempt is made to add a new record without completing (filling in all the fields) the previous record.

2) 'Simpan rekod' - Click this button to save a new record or a record that has been edited. An error message will be generated if an attempt is made to save a new record without completing (filling in all the fields) the form. A confirmation message will be prompted for a record that has been saved.
3) 'Buat Semula' - Click this button to undo the input of a current record that has not been saved yet. An error message will be generated if this button is clicked for a record which is already in the database.
4) 'Kemaskini' - Click this button to update a record.
5) 'Padam' - Click this button to delete a record in the database. A confirmation message will appear for the user to verify the delete, click 'Yes' to perform the delete and 'Cancel' to cancel it.
6) 'Cetak/Paparan' - Click this button to view a report on the disciplinary incidents of students.
7) 'Batal' - Click this button to exit to the 'Hal Ehwal Pelajar' menu.
8) Navigation Bar - Click this bar at either end of the bar to navigate the records in the database and to perform update.

Report:

Buttons (Report):

4) 'Refresh' (with a thunder symbol) - Click this button every time you generate a report for the new data or any changes to be added.
5) 'Export' (with a mail symbol) - Click this button to export your data to the other destination. A dialog box will appear, choose 'Word for Windows' as your 'format' and click 'OK'. This will then direct you to the export dialog box where you can enter the destination of your report.
6) ' Print' - Click this button to print your report.

A.3.7 'SPBT" module

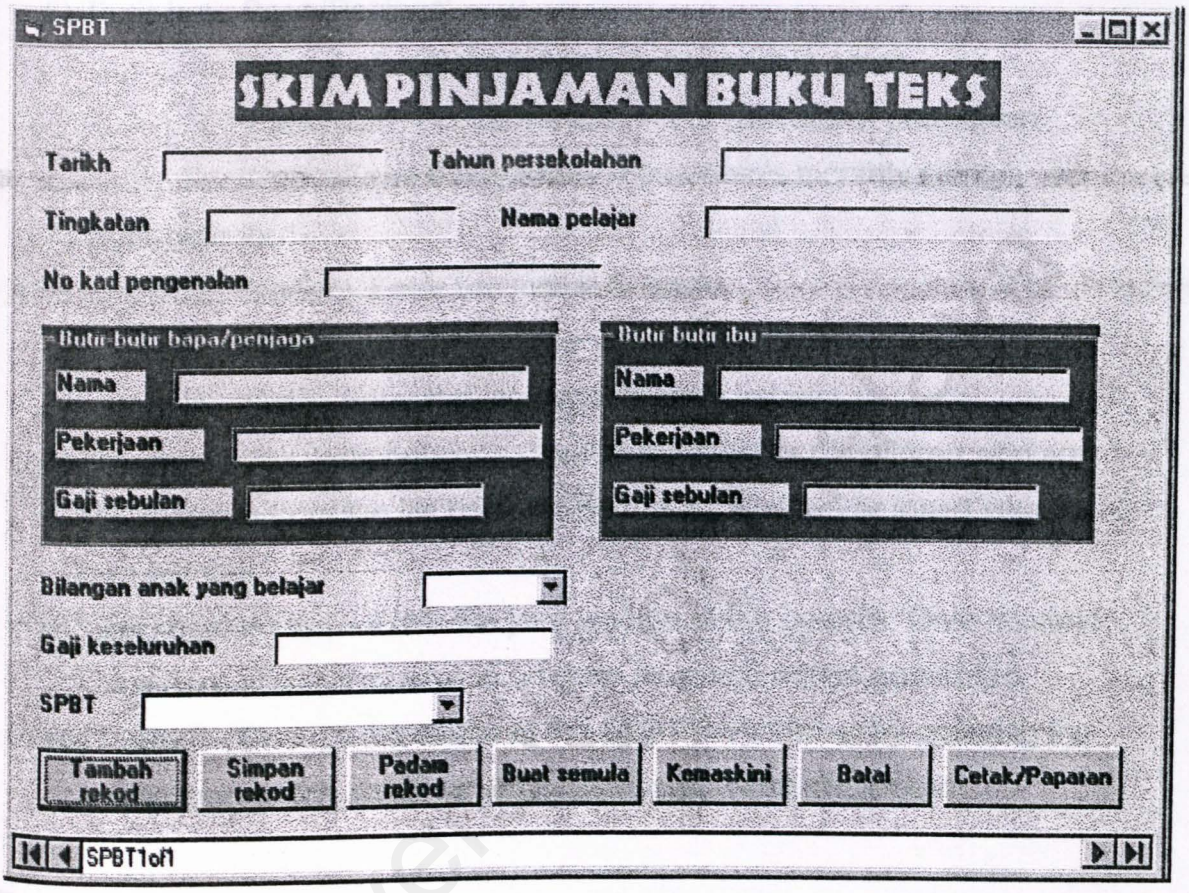

Figure A.3.7 - spbt.frm

Fields:

1) 'Tarikh' - Enter the current date with the format - dd/mm/yy.
2) 'Tahun Persekolahan' - Enter the current school year. Only numeric values are permitted otherwise an error message will be generated.
3) 'Tingkatan' - Enter the class name.
4) 'Nama pelajar' - Enter the student's name.

5) 'Nombor kad pengenalan' - Enter the student's identity card number with the format e.g 456787089780. An error message will be prompted for incorrect input of IC number.

6) 'Butir-butir Bapa/Penjaga' -

   i. 'Nama' - Enter the father's or guardian's name

   ii. 'Pekerjaan' - Enter the father's or guardian's profession

   iii. 'Gaji' - Enter the father's or guardian's monthly salary.

7) 'Butir-butir ibu' -

   i. 'Nama' - Enter the mother's name

   ii. 'Pekerjaan' - Enter the mother's profession

   iii. 'Gaji' - Enter the mother's monthly salary.

8) 'Bilangan anak yang belajar' - Choose the number of children who are still studying from the list by pressing the arrow down or insert your own number.

9) 'Gaji keseluruhan' - Enter the joint income of the parents. Only numeric values are allowed otherwise an error message will be generated.

10) ' SPBT' - Choose the status of the SPBT from the list by pressing the arrow down which contains 'Diluluskan' and 'Tidak diluluskan'.

Buttons:

1) 'Tambah Rekod' - Click this button to add a new record. An error message will be generated if an attempt is made to add a new record without completing (filling in all the fields) the previous record.

2) 'Simpan rekod' - Click this button to save a new record or a record that has been edited. An error message will be generated if an attempt is made to save a new record without completing (filling in all the fields) the form. A confirmation message will be prompted for a record that has been saved.

3) 'Buat Semula' - Click this button to undo the input of a current record that has not been saved yet. An error message will be generated if this button is clicked for a record which is already in the database.
4) 'Kemaskini' - Click this button to update a record.
5) 'Padam' - Click this button to delete a record in the database. A confirmation message will appear for the user to verify the delete, click 'Yes' to perform the delete and 'Cancel' to cancel it.
6) 'Cetak/Paparan' - Click this button to view a report on the disciplinary incidents of students.
7) 'Batal' - Click this button to exit to the 'Hal Ehwal Pelajar' menu.
8) Navigation Bar - Click this bar at either end of the bar to navigate the records in the database and to perform update.

Report:

Buttons (Report):

1) 'Refresh' (with a thunder symbol) - Click this button every time you generate a report for the new data or any changes to be added.
2) 'Export' (with a mail symbol) - Click this button to export your data to the other destination. A dialog box will appear, choose 'Word for Windows' as your 'format' and click 'OK'. This will then direct you to the export dialog box where you can enter the destination of your report.
3) 'Print' - Click this button to print your report.

A.3.8 'Biasiswa' module

Fields:

1) 'Tarikh' - Enter the current date with the format - dd/mm/yy.
2) 'Tahun Persekolahan' - Enter the current school year. Only numeric values are permitted otherwise an error message will be generated.
3) 'Tingkatan' - Enter the class name.
4) 'Nama pelajar' - Enter the student's name.
5) 'Nombor kad pengenalan' - Enter the student's identity card number with the format e.g 456787089780. An error message will be prompted for incorrect input of IC number.
6) 'Bilangan anak dalam isirumah yang masih belajar' - Choose the number of the student's siblings who are still studying by pressing the arrow down or insert on your own.
7) 'Pendapatan keseluruhan isirumah' - Enter the monthly income of the family. Only numeric values are allowed otherwise an error message will be generated.
8) 'Nama penaja' - Enter the name of the scholarship donor.
9) 'Alamat penaja' - Enter the address of the donor.
10) ' Poskod' - Enter the postcode of the address of the donor.
11) ' Negeri' - Choose the donor's state from the list by pressing the arrow down.
12) ' Jumlah tajaan' - Enter the amount of grant.

Buttons:

1) 'Tambah Rekod' - Click this button to add a new record. An error message will be generated if an attempt is made to add a new record without completing (filling in all the fields) the previous record.
2) 'Simpan rekod' - Click this button to save a new record or a record that has been edited. An error message will be generated if an attempt is

made to save a new record without completing (filling in all the fields) the form. A confirmation message will be prompted for a record that has been saved.

3) 'Buat Semula' - Click this button to undo the input of a current record that has not been saved yet. An error message will be generated if this button is clicked for a record which is already in the database.
4) 'Kemaskini' - Click this button to update a record.
5) 'Padam' - Click this button to delete a record in the database. A confirmation message will appear for the user to verify the delete, click 'Yes' to perform the delete and 'Cancel' to cancel it.
6) 'Cetak/Paparan' - Click this button to view a report on the disciplinary incidents of students.
7) 'Batal' - Click this button to exit to the 'Hal Ehwal Pelajar' menu.
8) Navigation Bar - Click this bar at either end of the bar to navigate the records in the database and to perform update.

Report:

Buttons (Report):

1) 'Refresh' (with a thunder symbol) - Click this button every time you generate a report for the new data or any changes to be added.
2) 'Export' (with a mail symbol) - Click this button to export your data to the other destination. A dialog box will appear, choose 'Word for Windows' as your 'format' and click 'OK'. This will then direct you to the export dialog box where you can enter the destination of your report.
3) ' Print' - Click this button to print your report.

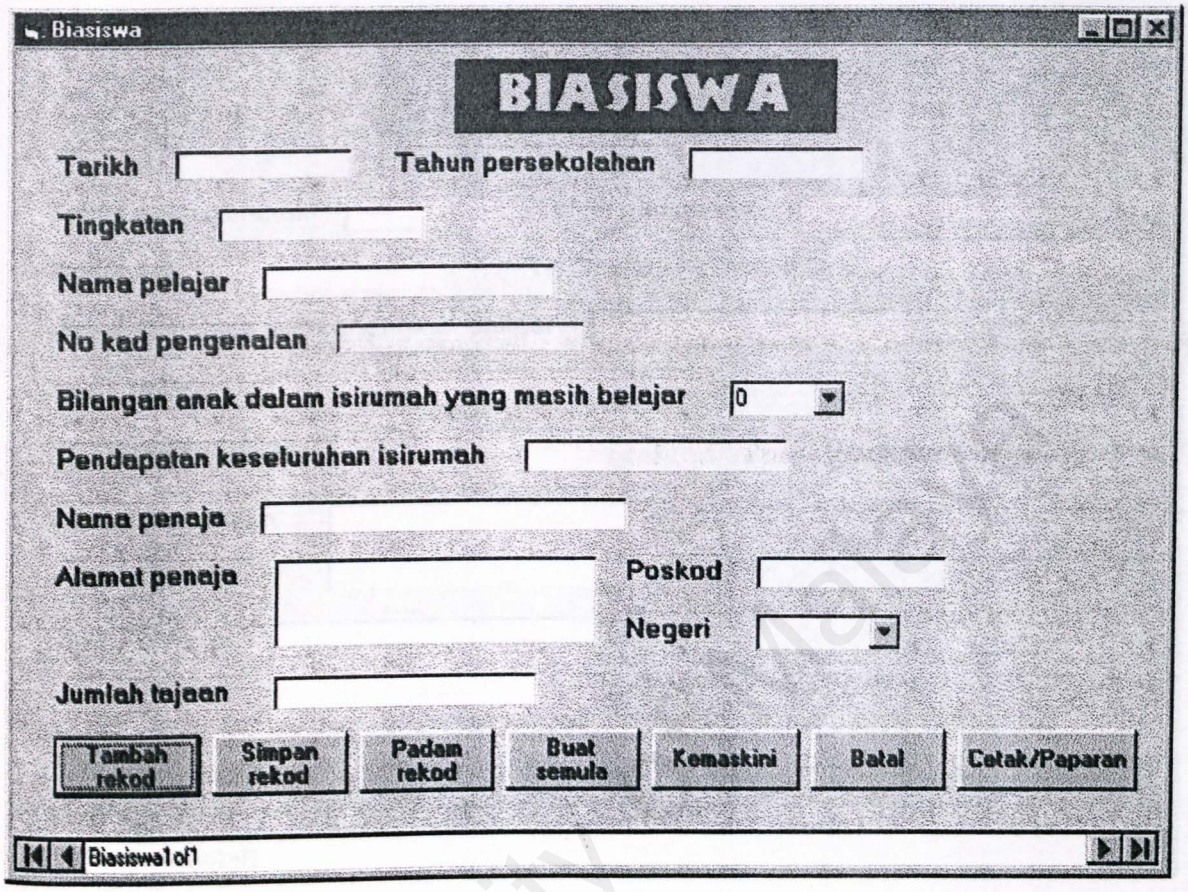

Figure A.3.8 - biasiswa.frm

A.3.9 'Kaunselling' module

Fields:

1) 'Tarikh' - Enter the current date with the format - dd/mm/yy.
2) 'Tahun Persekolahan' - Enter the current school year. Only numeric values are permitted otherwise an error message will be generated.
4) 'Tingkatan' - Enter the class name.
5) 'Nama guru kaunselling' - Enter the counsellor's name.
6) 'Nama pelajar' - Enter the student's name.

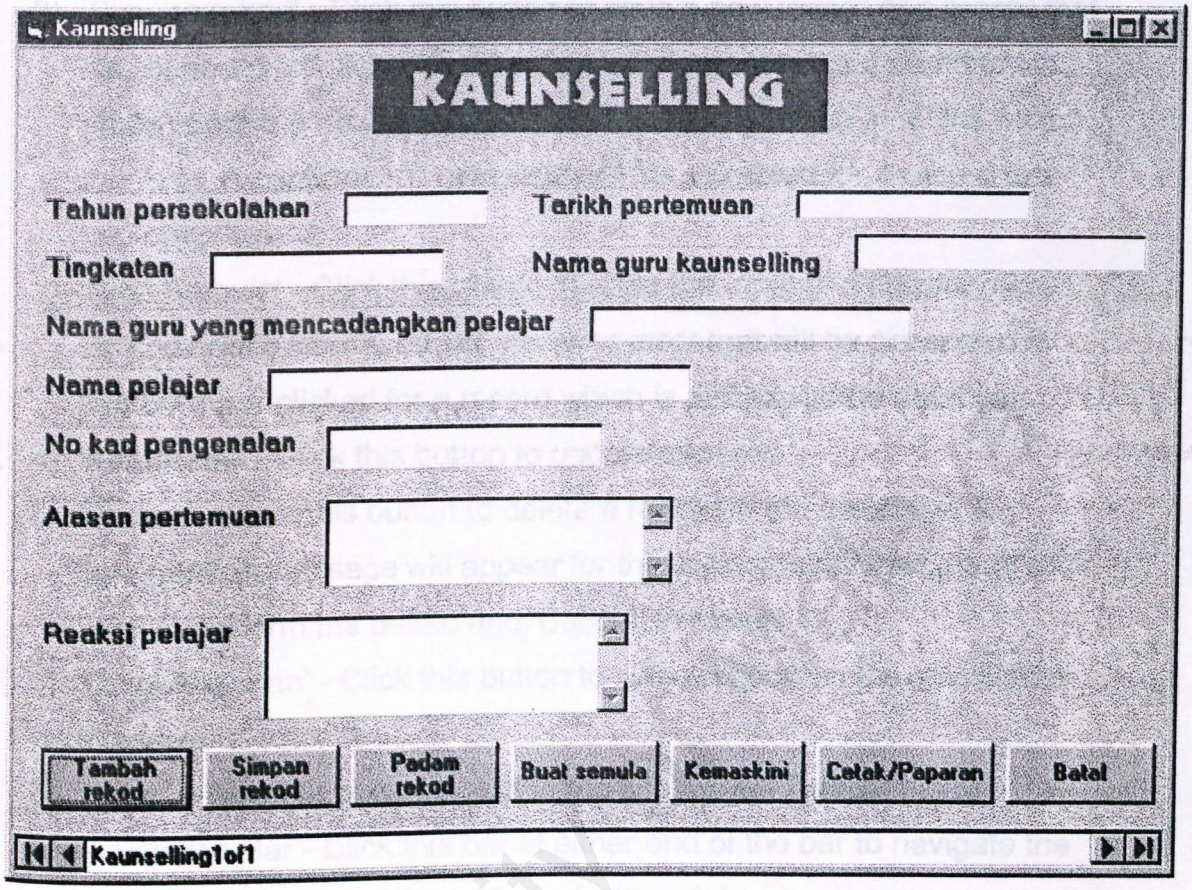

Figure A.3.9 - kaunselling.frm

7) 'No kad pengenalan' - Enter the student's identity card number with the format e.g 456787089780. An error message will be prompted for incorrect input of IC number.
8) 'Alasan pertemuan' - Enter the reason for the counselling.
9) 'Reaksi pelajar' - Enter the student's reaction from the counselling session.

Buttons:

1) 'Tambah Rekod' - Click this button to add a new record. An error message will be generated if an attempt is made to add a new record without completing (filling in all the fields) the previous record.

2) 'Simpan rekod' - Click this button to save a new record or a record that has been edited. An error message will be generated if an attempt is made to save a new record without completing (filling in all the fields) the form. A confirmation message will be prompted for a record that has been saved.
3) 'Buat Semula' - Click this button to undo the input of a current record that has not been saved yet. An error message will be generated if this button is clicked for a record which is already in the database.
4) 'Kemaskini' - Click this button to update a record.
5) 'Padam' - Click this button to delete a record in the database. A confirmation message will appear for the user to verify the delete, click 'Yes' to perform the delete and 'Cancel' to cancel it.
6) 'Cetak/Paparan' - Click this button to view a report on the disciplinary incidents of students.
7) 'Batal' - Click this button to exit to the 'Hal Ehwal Pelajar' menu.
8) Navigation Bar - Click this bar at either end of the bar to navigate the records in the database and to perform update.

Report:

Buttons (Report):

1) 'Refresh' (with a thunder symbol) - Click this button every time you generate a report for the new data or any changes to be added.
2) 'Export' (with a mail symbol) - Click this button to export your data to the other destination. A dialog box will appear, choose 'Word for Windows' as your 'format' and click 'OK'. This will then direct you to the export dialog box where you can enter the destination of your report.

3)' Print' - Click this button to print your report.

Appendix B:

CODING

B.1 CODING

This coding is taken from the login module of ISMIS.

```
Dim pass As Long

Private Sub cmdbatal_Click()

Call frmmenu.Show
Form1.Hide
End Sub

Private Sub cmdmasuk_Click()

If txtkata.Text = "" Then
   MsgBox ("Masukkan Katalaluan dahulu!")
End If

On Error GoTo errhi
pass = Trim(txtkata)
If pass = Data1.Recordset.Fields("Kata_laluan") Then
   frmhep.Show
   Form1.Hide
Else
   MsgBox ("Katalaluan salah, tolong masukkan sekali lagi!")

End If

errhi:
If Error = 13 Then
MsgBox ("Masukkan Katalaluan dahulu!")
End If


End Sub

Private Sub cmdtukar_Click()

If txtkata.Text = "" Then
   MsgBox ("Masukkan Katalaluan dahulu!")
End If

On Error GoTo errki
pass = Trim(txtkata)
If pass = Data1.Recordset.Fields("Kata_laluan") Then
```

```
    Form2.Show
  Else
    MsgBox ("Masukkan katalaluan yang betul!")
  End If

  errki:
  If Error = 13 Then
  MsgBox ("Masukkan Katalaluan dahulu!")
  End If

  End Sub

  Private Sub Form_Activate()

  txtkata.Text = ""

  End Sub


  Private Sub Form_Load()


  newpass = (txtkata)

  End Sub


  Private Sub txtkata_KeyPress(KeyAscii As Integer)

  If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
  KeyAscii = 0
  MsgBox ("Anda hanya boleh masukkan nombor!")
  txtkata.Text = ""
  End If

  End Sub
```

This coding is taken from the password changing module.

```
Dim newpass As Long

Private Sub cmdbatal_Click()
   Form1.Show
End Sub
```

```
Private Sub cmdtukar_Click()

If Trim(txtkata) = Trim(txtverify) Then

  Data1.Refresh
  Data1.Recordset.AddNew
  Data1.Recordset.Fields("Kata_laluan") = Trim(txtkata)


  newpass = (txtkata)
  Call Form1.Show
  Form2.Hide
Else
MsgBox ("Tolong masukkan sekali lagi!")

End If
End Sub

Private Sub Form_Load()
Call Load(Form1)
End Sub

Private Sub txtkata_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
txtkata.Text = ""

End If

End Sub

Private Sub txtverify_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
txtverify.Text = ""
End If

End Sub
```

The coding below is taken from the 'Kedatangan' module

```
Option Explicit
Dim lTotalRecords As Long


Private Sub cmdbatal_Click()
   Call frmhep.Show

End Sub

Private Sub cmdkemaskini_Click()
Static vMyBookMark As Variant
Dim iReturnValue As Integer


If cmb_permohonan.Text = "" Then
MsgBox ("Kemaskinikan rekod yang wujud sahaja!")
End If

   With Data1.Recordset
      If (.EditMode = dbEditNone) Then
      vMyBookMark = .Bookmark
      .Edit
      End If
      End With
      GoTo DONE

DONE:
MsgBox ("Sila ubah data yang perlu dan seterusnya tekan Simpan rekod")

End Sub

Private Sub cmdpadam_Click()
Dim iResponse As Integer
Dim sAskUser As String
Dim iReturnValue As Integer

On Error GoTo merr
sAskUser = "Adakah anda ingin padam rekod ini?"
iResponse = MsgBox(sAskUser, vbQuestion + vbYesNo + _
        vbDefaultButton2, "SPBT")
If (iResponse = vbYes) Then
With Data1.Recordset
      .Delete
      .AddNew
```

```
        lTotalRecords = .RecordCount
        If (lTotalRecords > 0) Then
        If lTotalRecords = 1 Then
            .MoveFirst
        ElseIf .BOF Then
            .MovePrevious
      End If
     End If
    End With
  End If

  merr:
  If Error = 3021 Then
  iReturnValue = MsgBox("Rekod ini sudah dipadam", vbExclamation)
  End If

  End Sub

  Private Sub cmdsemula_Click()
  Static vMyBookMark As Variant
  Dim iResponse As Integer
  Dim sAskUser As String
  Dim iReturnValue As Integer

  On Error GoTo merr
  sAskUser = "Ditekan untuk rekod yang belum disimpan sahaja"
  iResponse = MsgBox(sAskUser, vbOK + _
          vbDefaultButton2, "SPBT")
  If (iResponse = vbOK) Then
  With Data1.Recordset
     If (.EditMode <> dbEditNone) Then
        .CancelUpdate
        .AddNew
     If (Len(vMyBookMark)) Then
     .Bookmark = vMyBookMark

     End If
  Else
     .Move 0
  End If

 End With
 End If

 merr:
 End Sub
```

```
Private Sub cmdsimpan_Click()
  Dim sum As Integer
  Dim bapa As Integer
  Dim ibu As Integer

If cmb_permohonan.Text = "" Then
 MsgBox ("Sila masukkan data dalam semua medan!")

ElseIf Len(mskkp) <> 12 Then
   MsgBox ("Sila masukkan nombor kad pengenalan yang betul!")

Else

   MsgBox ("Rekod anda sudah disimpan")
   Data1.Refresh
   'Data1.Recordset.AddNew

End If

End Sub

Private Sub cmdtambah_Click()
Dim sum As Integer

If cmb_permohonan.Text = "" Then
MsgBox ("Sila masukkan data dalam semua medan!")
End If

 Data1.Refresh
 Data1.Recordset.AddNew
 Exit Sub

End Sub

Private Sub Command1_Click()

CrystalReport1.PrintReport

End Sub

Private Sub Data1_Reposition()

With Data1.Recordset

Data1.Caption = "SPBT" & (.AbsolutePosition + 1) & _
```

```
            "of" & lTotalRecords
            lTotalRecords = .RecordCount

 End With

 End Sub

 Private Sub Form_Activate()

 On Error GoTo errki
 With Data1.Recordset
    .MoveLast
    lTotalRecords = .RecordCount

mskkp.Mask = ""
End With

errki:

End Sub

Private Sub Form_Load()
   Call Load(frmhep)

On Error GoTo madderr

 Data1.Refresh
 Data1.Recordset.AddNew

 Exit Sub

madderr:
MsgBox ("Kemasukkan rekod berjaya")
End Sub

Private Sub txtgaji_bapa_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
txtgaji_bapa.Text = ""
End If
```

```
End Sub


Private Sub txtgaji_ibu_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
End If

End Sub

Private Sub txtseluruh_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
End If

End Sub


Private Sub txtthn_persek_KeyPress(KeyAscii As Integer)

If KeyAscii < Asc("0") Or KeyAscii > Asc("9") Then
KeyAscii = 0
MsgBox ("Anda hanya boleh masukkan nombor!")
End If

End Sub
```